Modern Metals

APRIL, 1961

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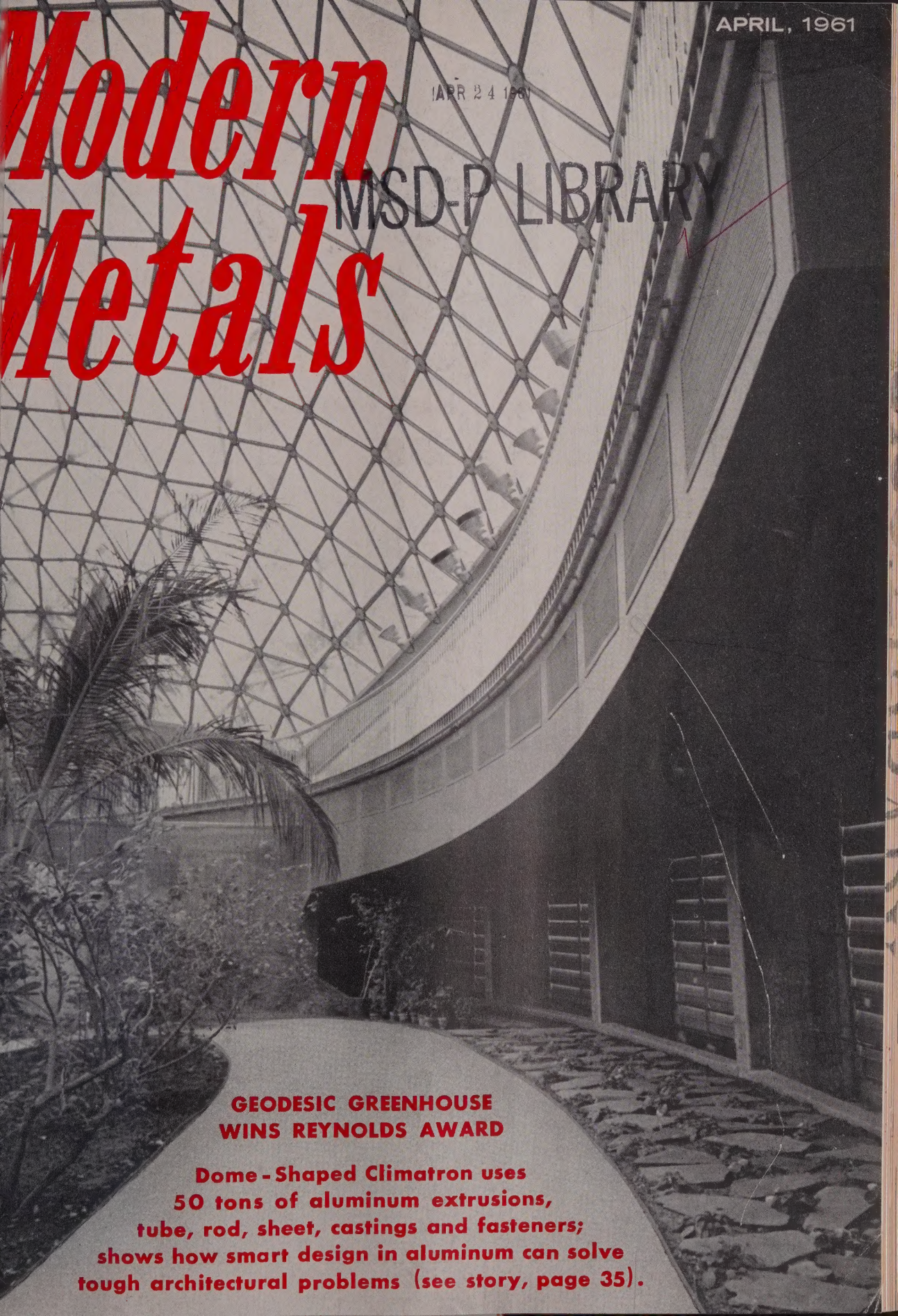
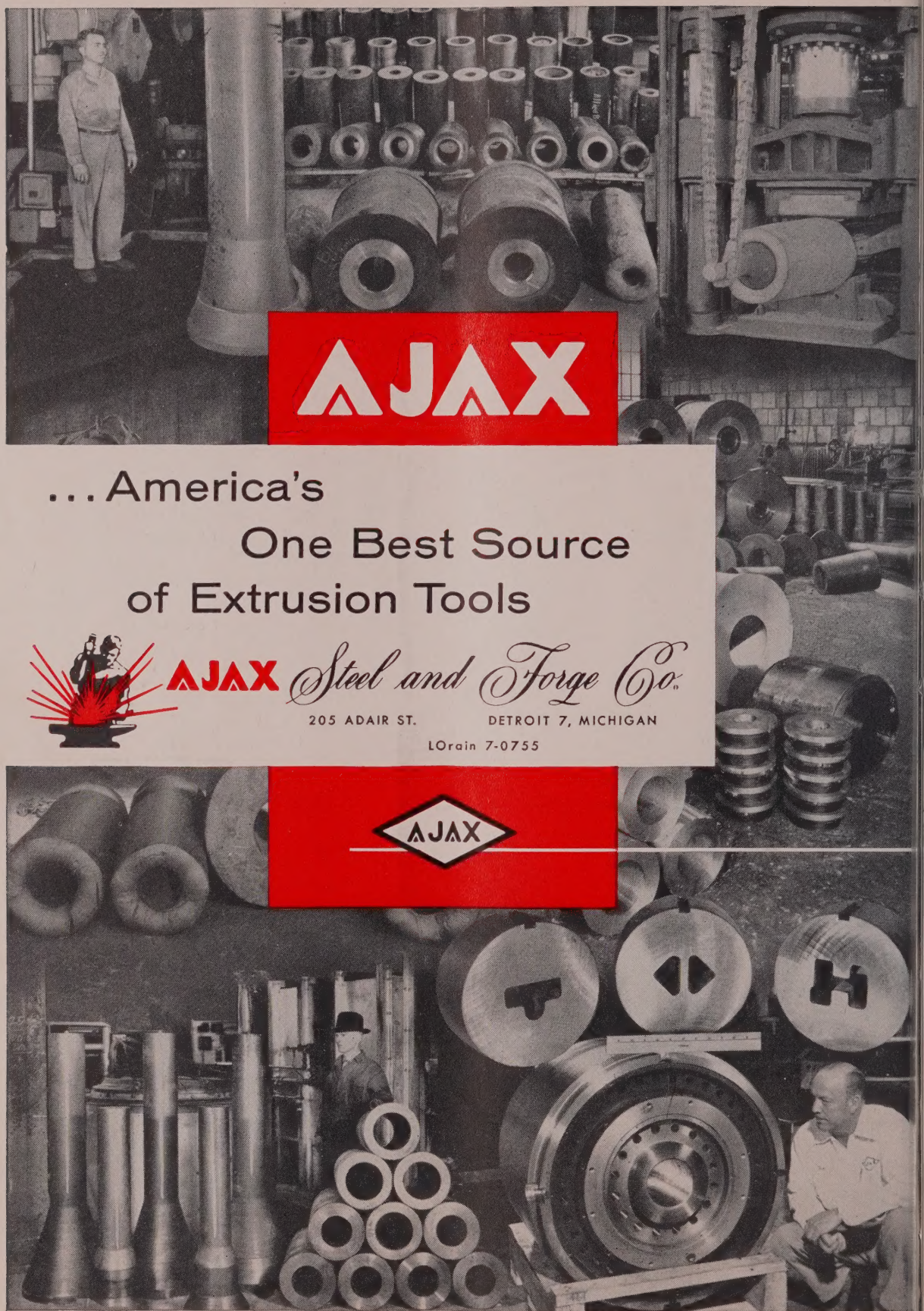


GEODESIC GREENHOUSE WINS REYNOLDS AWARD

Dome-Shaped Climatron uses 50 tons of aluminum extrusions, tube, rod, sheet, castings and fasteners; shows how smart design in aluminum can solve tough architectural problems **(see story, page 35).**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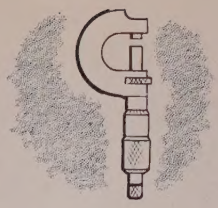
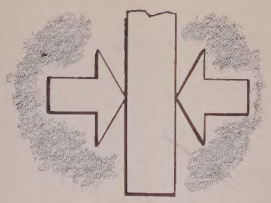


ACCURATE!



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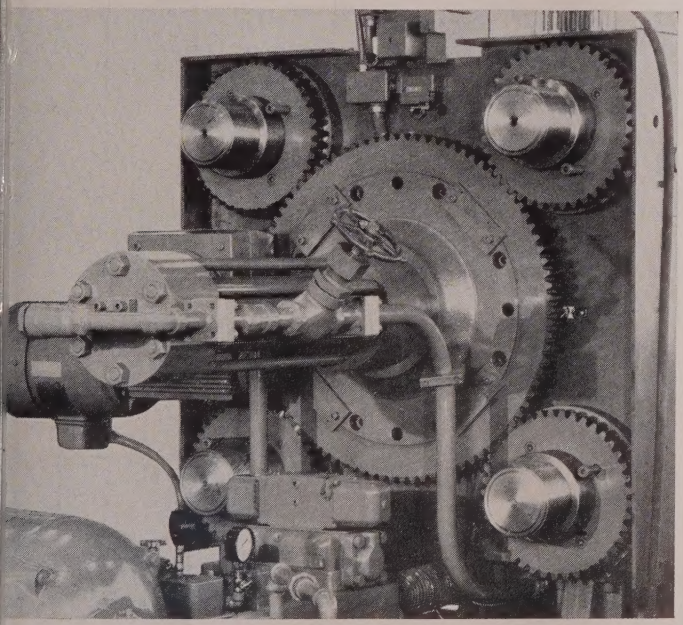
PUSH-BUTTON DIE HEIGHT ADJUSTMENT AND TONNAGE CONTROL... *a valuable operating advantage of Greenlee-B & T Die Casting Machines*



At the touch of a button you can now get die height adjustment for set-up and tonnage control. The Greenlee-B & T system uses a gear-head electric motor to drive a large bull gear which in turn drives a pinion gear on each tie bar nut.

This system maintains . . .

(1) inherent rigidity of our clamp by equal loading of each tie bar and set of four corner links.

(2) large bumper bar pattern, both vertical and horizontal, because there is no central screw interference.

(3) large range of die height adjustment normally available with tie bar nut machines without sacrificing individual nut adjustment.

(4) accessibility of hydraulic ejector mechanism.

Greenlee-B & T motorized die height adjustment permits the flexibility of other designs. In addition it provides easier control and adjustment without sacrificing rigidity. Write for complete information.

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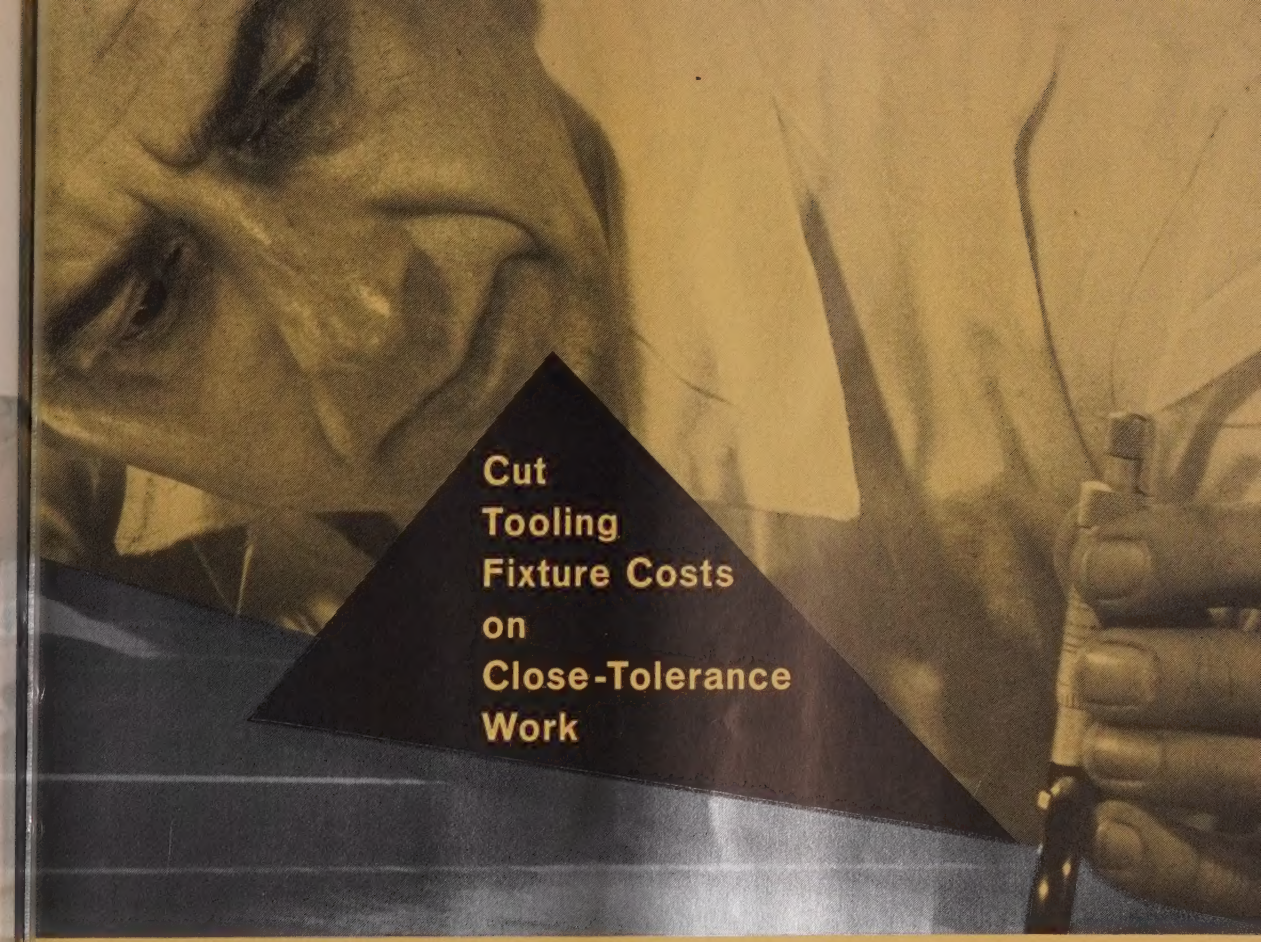

...specify
Reynolds Type 33
Wrought Aluminum Tooling Plate

Reynolds Type 33 Wrought Aluminum Tooling Plate provides stability, flatness, finish, and *workability* never before possible in so low-cost a plate.

Its *32 micro-inch finish* assures extremely smooth surfaces and close gauge tolerances. It provides minimum residual stress for maximum stability.

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Because this aluminum plate is *wrought*, it offers freedom from porosity, and is usable in more tooling applications. Reynolds Type 33 Plate is *extra rigid*—more rigid than magnesium, less brittle than cast plates.

And, of course, aluminum wrought plate is lightweight, easy to handle; it cuts labor and permits use of smaller handling equipment—can frequently be handled by one man. Easy to machine, cut, form and weld, wrought aluminum plate can lower production and tool costs, as well.

For complete information on Reynolds Type 33 Wrought Aluminum, see your nearest Reynolds Aluminum Distributor or Reynolds Sales Office. Or, write to the *Reynolds Metals Company, Box 2346-KL, Richmond 18, Virginia.*

Watch Reynolds TV show
"Harrigan & Son", Fridays—ABC-TV

See next page for details——→

REYNOLDS TYPE 33 WROUGHT ALUMINUM TOOLING PLATE

Available in thicknesses ranging from .250″ to 6″, widths from 24″ to 120″ and lengths from 36″ to 480″, Reynolds Wrought Aluminum Tooling Plate offers close tolerances and maximum freedom from stress. It offers new production savings for light and heavy industry, in applications ranging from aircraft manufacturing to electronics fabrication. Plastic molds, drill plates, templates, assembly fixtures, structural supports, press blocks *all* have been successfully made from easy-working and lightweight wrought aluminum tooling plate.

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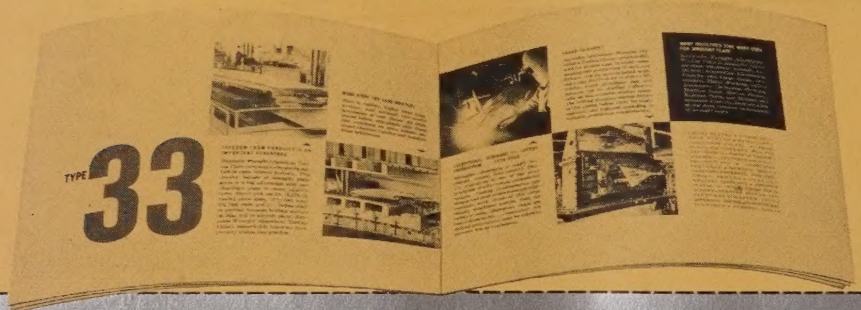


Contact your local Reynolds branch office, or send in the coupon below for your free copy of the Reynolds brochure on this new tooling plate. Complete data on specifications and availability.

Reynolds Metals Company
P.O. Box 2346-KL, Richmond 18, Virginia

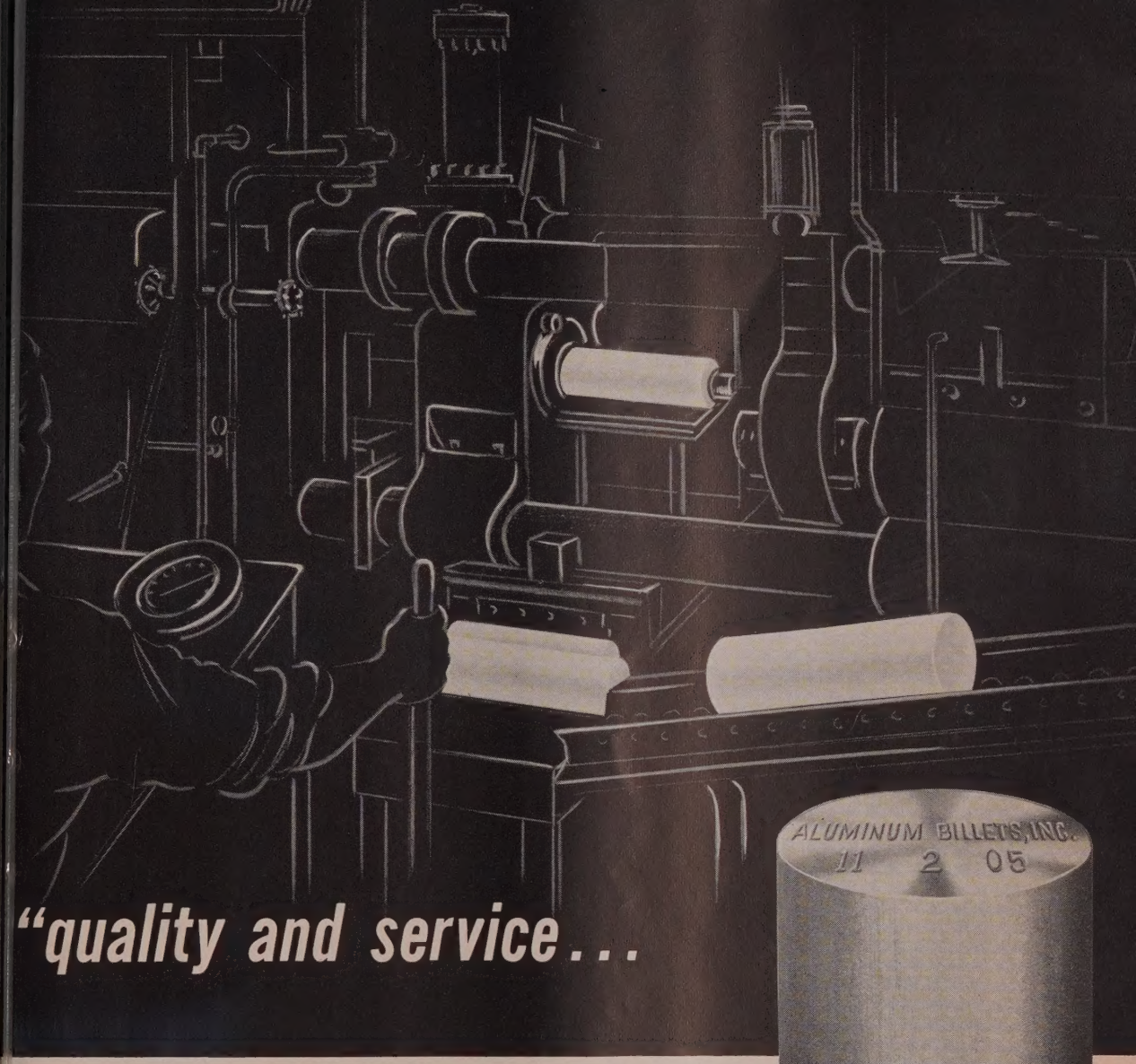
Please send me full information on **REYNOLDS WROUGHT ALUMINUM TOOLING PLATE**

Name_____ Position_____

Firm_____ Street_____

City_____ Zone_____ State_____

REYNOLDS ALUMINUM



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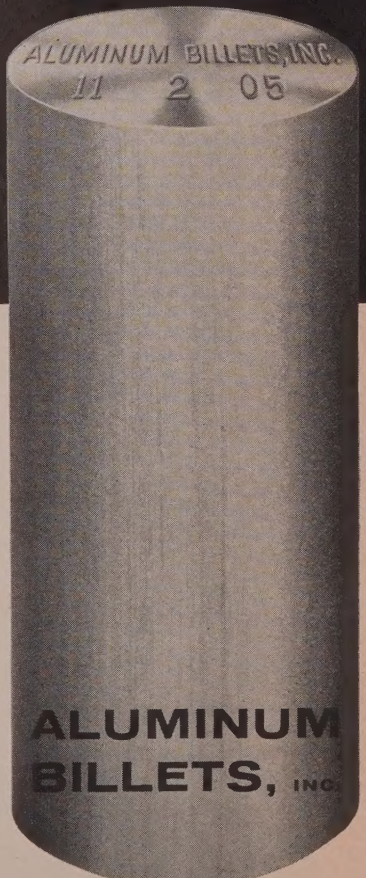

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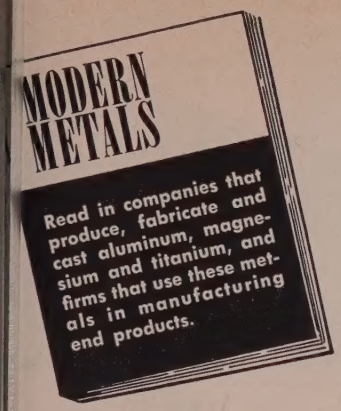
MODERN METALS
Read in companies that produce, fabricate and cast aluminum, magnesium and titanium, and firms that use these metals in manufacturing end products.

THE COVER: A unique dome-shaped house in St. Louis finally brought a olds architectural award to the U.S. gners took all the previous awards). tects Murphy and Mackey created a spherical "curtain wall" of plexiglass luminum; hung it inside a geodesic -shaped spaceframe made of aluminum rod and castings. We think it's the original and creative design to win Reynolds Award. The story starts on 35.

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Modern Metals

VOLUME XVII **APRIL, 1961** **NUMBER 3**

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GREENHOUSE WINS REYNOLDS AWARD **35**
Dome-shaped award winner uses 50 tons of aluminum extrusions, tube, rod, sheet, castings, fasteners; shows how smart design in aluminum can overcome tough architectural problems.

BOEING SAND CASTS TURBINE PARTS ..... K. B. Rhodie **40**
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SIDING MAKERS DISPUTE FTC RULES **56**
Second hearing on establishment of trade practice rules for siding industry marked by disagreement.

PRODUCING ALUMINUM FROM CLAY **59**
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GREATER INTEGRATION FOR BROADER PRODUCT LINES ..... H. K. Darby **60**
Fabricator installs cold rolling mill and roll-coating line; develops new products for tomorrow's big "home and yard market."

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Discussed are: Blind, drive, high strength, self-sealing, and insulating rivets; self-locking, self-sealing screws and bolts; thread locking plastic; self-drilling sheet metal screws.

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DERMITRON
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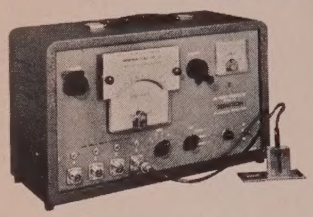

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Letters

Wants Aluminum Bells For Charm Bracelets

Sirs:

How can I produce miniature bells out of aluminum? Let's say as small as those worn on charm bracelets and some as large as, or as wide at the mouth of the bell as a dime to a quarter, and have a pleasant sound in all cases. They would have to be anodized when finished—for color.

How are they manufactured? What type of aluminum is used? I am thinking of both cast or punched. Are there any firms that manufacture them?

"H"—Ohio

MM—One or two Japanese firms manufacture little aluminum bells (we've received some, but they didn't advise where they came from). We also have an idea that some firms in Germany are making them.

Anyone know of an American manufacturer of small aluminum bells?

Hard Anodized Casting Molds

Sirs:

I noted with interest your paragraph on hard anodized molds in the December issue "Here and There" column. I have enclosed a letter requesting further information on the process and would greatly appreciate your forwarding it to the correct firm and address where this information can be obtained.

"D"—California

MM—This patented casting process was developed in England by Dr. Conrad Parlanti. It has been licensed to General Communications Co., 677 Beacon St., Boston, Mass., and the firm is licensing foundries. We have forwarded your letter to them.

Wants Thin Wall Aluminum Antenna Tube

Sirs:

We are interested in receiving quotations and literature on thin wall aluminum tubing for indoor television antennas, in lots of 5000 pounds per size, 5/16, ¼, 3/16 x .016". . . .

"M"—New York

MM—We have sent you a list of reliable aluminum tube manufacturers, many of whom can supply you in the sizes you specify.

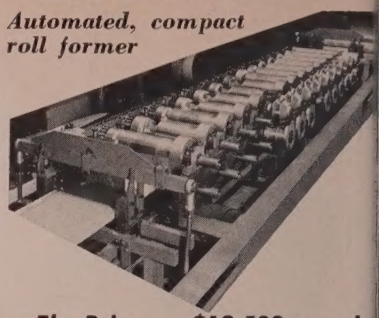
We have reprinted our latest Light Metals Buyers Directory which lists names and addresses of manufacturers of virtually every light metals product, equipment used for light metals, and services. Copies are available gratis.

Wants Aluminum Christmas Trees in Quantity

Sirs:

We understand you are manufacturers of aluminum Christmas trees, and we would be pleased to have you quote on quantities of 10,000, 25,000 and 50,000 pieces in bulk, individual pack, together with in-

"SIDEKING"
Automated, compact roll former



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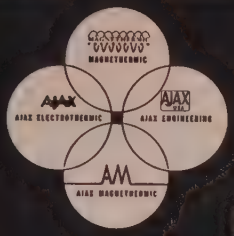
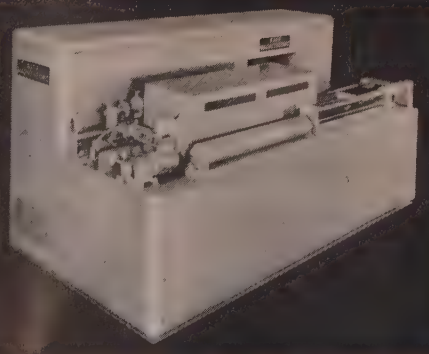


TAPER HEATING... ONE OF MANY WAYS BILLET HEATING BY INDUCTION INCREASES PRODUCTION OF EXTRUSIONS



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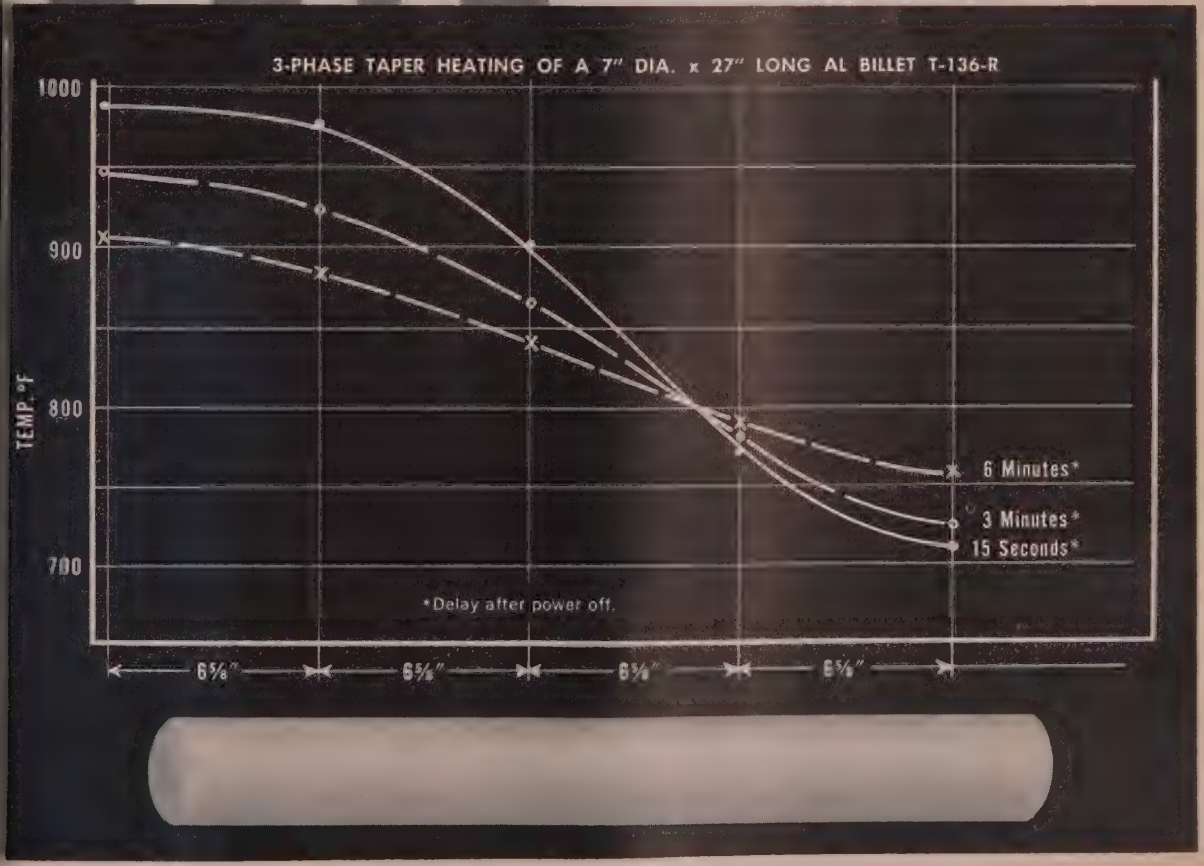
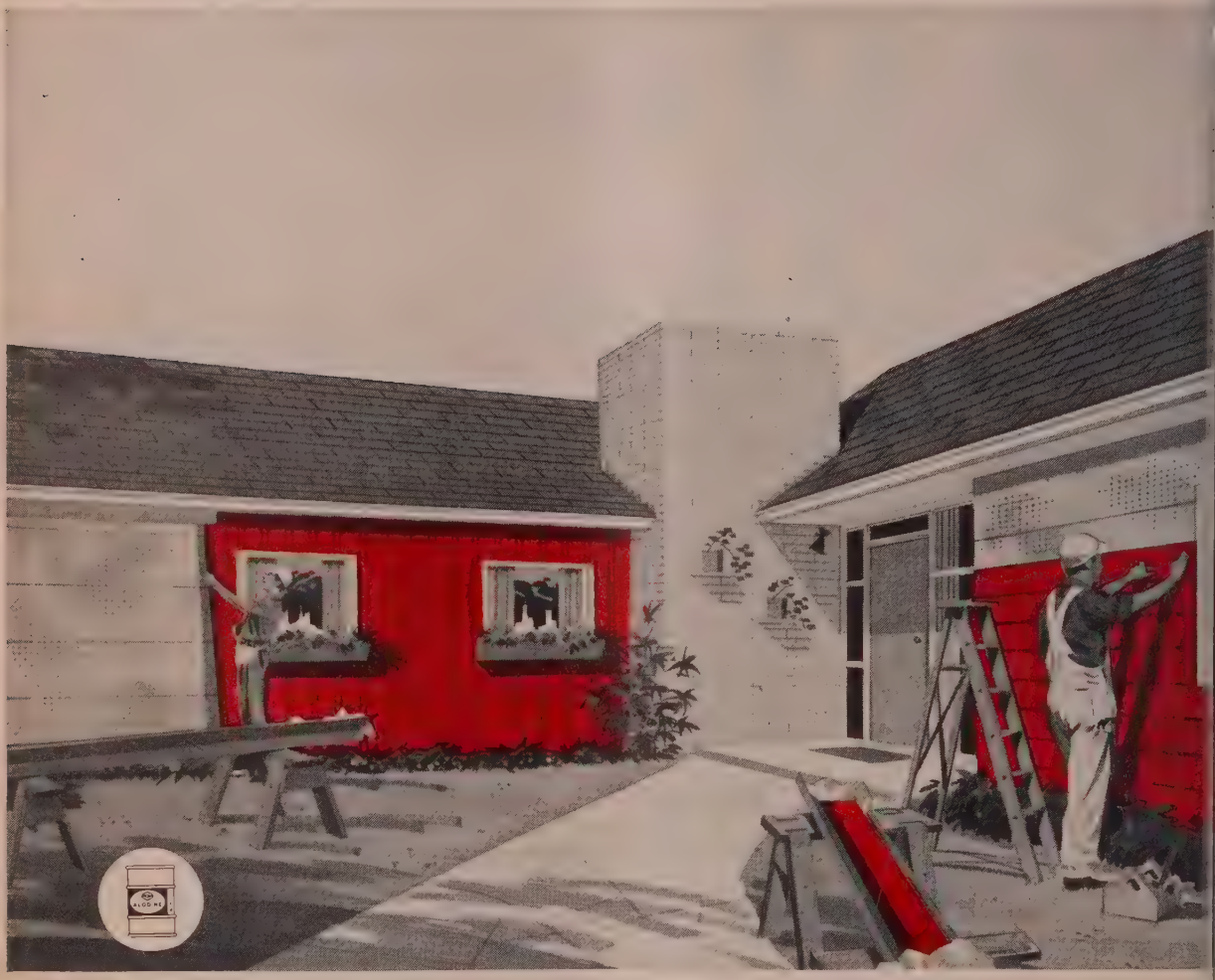


Another finishing first from Amchem!

ALODINE* Chemicals for Spray-Di
Processing Costs in Half Throug
and Handling at Crown Aluminum



Crown aluminum siding features beauty, durability and convenience . . . a wide selection of color harmonized paints, year-in, year-out product performance and virtually no maintenance. Amchem Alodine plays a key role in providing the paint system with its outstanding wearing qualities.

re-Paint Finishing Slashes
educed Maintenance, Downtime

Mr. LOUIS HIRSCH, dynamic Crown President says—

"THE INDUSTRY'S FIRST ORIGINAL DESIGN SPRAY-DIP SYSTEM HAS LOWERED THE COST OF SIDING PROCESSING WHILE MAINTAINING HIGH QUALITY AND UNIFORMITY"

ed and designed by Amchem in conjunction with n engineers and quality control personnel, *the ry's first spray-dip, pre-paint system designed from ound up*, is providing Crown Aluminum—one of the n's top three siding producers, with unprecedented gs in processing costs, time and labor.

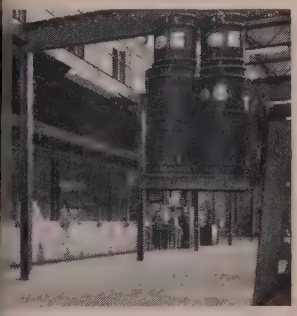
veral million square feet of aluminum strip treated te, Crown can point to a 50 percent reduction in ll processing costs through virtual elimination of maintenance and downtime. With the addition of ew line, siding production capacity has doubled.

de-by-side comparisons with an existing all-spray m at Crown's Roxboro (N. C.) plant, the new spray- ombination has demonstrated outstanding superiority over straight spray—the result of eliminating complicated, time-consuming periodic maintenance associated with spray chamber operation.

Under all of Crown's exacting test standards—salt spray, humidity, infra-red—Alodine quality has remained constant. The proof—not a single paint failure complaint from the field since production started!

If you're considering installation of pre-finishing equipment, or refurbishing your present system—don't make a move till you've investigated Amchem Alodine and spray-dip for coated coil processing. Your nearest Amchem Representative is ready to supply facts and figures on system requirements at your convenience.

* Amchem's registered trademark for its conversion coating chemicals for aluminum.



vn 5-stage Amchem spray-dip line ed on mezzanine level of plant. rail length of finishing and paint is 291'6".

Amchem electronic sensing device on stage one cleaner provides automated feed of chemicals.

Amchem Technical Representative conferring with Crown Production Supt. George Hagler (left) on final adjustments to new paint line.

AMCHEM **ALODINE**

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Write for Bulletin 1424C, gives detailed technical specifications on different Alodine chemicals available for pre-treating aluminum.

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NEW EXCELLENT CONDITION

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.025x48x144" (AZ-31-H24-QQ-M-44)	4 Sheets
.032x48x144" (QQ-M-44-cond.-A-52-SO)	70 Sheets
.032x48x144" (QQ-M-44H-FSI-H-24)	33 Sheets
.040x48x144" (AZ-31B-H-24-QQ-M-44A)	4 Sheets
.050x36x51"	1 Sheet
.050x48x144" (AZ-31B-H-24-QQ-M-44A)	4 Sheets
.081x48x144" (QQ-M-44-cond.-H)	2 Sheets
.125x48x144" (M-H-24-QQ-M-54-H)	7 Sheets
.310x36x120" (FSI-H-26)(AMS. 4376)	1 Sheet

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with stretcher, oven, power plant, etc., should not be more than 5 years old. Capacity 1250 to 1500 ton.

BOX 411

MODERN METALS

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How To Clean & Finish Aluminum

To get your copy of this 36-page manual use order form on page 30

formation as to individual weight and F.O.B. points.

The sizes we are primarily interested in is 2 ft. to 6 ft., but perhaps you have special promotional trees available. This merchandise is required for a promotion later this year, but we would require to know how much notice you would need for production of the quantities outlined above.

"D"—Ontario

MM—We've never gotten around to manufacturing light metals products—but if we ever hit a slump, we may start up a line or two.

There are currently 12 to 15 manufacturers of aluminum Christmas trees in the U.S.A. If any of them want to quote on a Canadian order, we'll forward letters to "D".

We'll Send a Sample Copy Anywhere

Sirs:

We found the March article on "How to Fasten Aluminum" extremely informative, as well as the story on aluminum light poles. . . .

One of our "friendly" competitors does not see Modern Metals. If you would send them the March issue, I'm sure they would want to subscribe. Their name is. . . .

"J"—England

MM—We'll gladly send a sample copy to any light metals user—no matter where or why. If any of our 88 readers have friends who could survive looking at a copy of you-know-what, just send in their names; we'll gladly do the rest.

The fastener series—which started in January—was to be completed in this issue. But we received so much additional material last month that we couldn't squeeze all of it in. The series will be concluded in May; will make a 44-page reprint which will be available late next month at $1.00 a copy. We do not expect this manual to create as much interest as our 36-page reprint, "How to Clean and Finish Aluminum." We have sold 17,000 copies of it so far, and it's still going strong. But advance orders for the fastening manual already exceed 5000; will probably top 10,000.

Extruders Abroad

Sirs:

We are wondering if it would be possible for you to supply us with information as to how many extruders there are in all of the foreign countries, what their capacities are, and their locations?

We are now licensing manufacturers to make our products in certain foreign countries, and we have some specific inquiries as to the availability of extrusions in India and Egypt, particularly. We are contemplating licensing manufacturers in several other foreign countries, and if such information is available, it would be of tremendous help to us. . . .

"F"—Iowa

MM—Our guess is that there are probably somewhere between 30 to 50 outside the U.S.A.—and we suspect that most, or all, of them are included in our circulation files. However, we have never attempted to classify by product our foreign circulation (the domestic scene is tough enough), so can't help you.

Sometimes the Washington embassies of various countries can be helpful. Worth a try.

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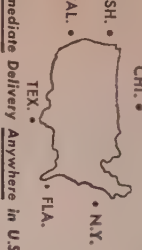

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Give age, family, experience, references, salary requirement. Enclose photograph.

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MODERN METALS

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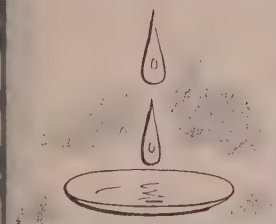
MEETS J. I. C. SPECIFICATIONS



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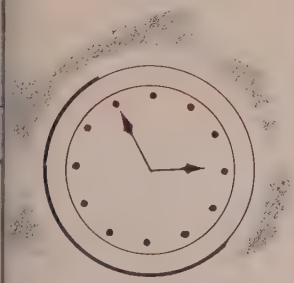

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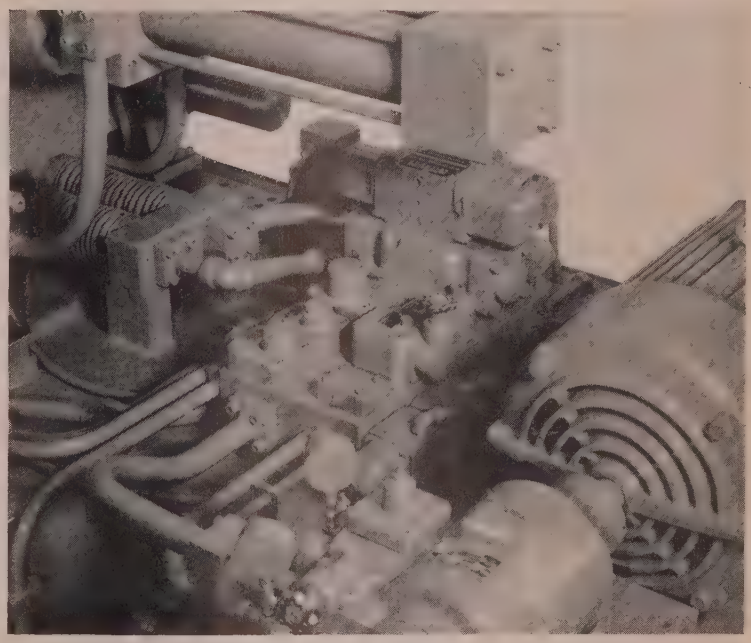

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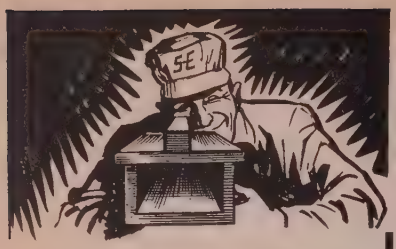

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Here and There

Competition — It's Great « « Our competitors are all a bunch of unowhats — but sometimes they're also amusing. For instance, last year a new weekly paper came on the scene called "Metalworking News." It's big slogan was, and still is: "The big difference is news." It promised 30,000 circulation. It entered a field dominated by two daily newspapers (one has since given up). The other had been going along at the same old gait for many a decade without much change. That is, until "Metalworking News" was born. Then — whoosh! It's size, format, reporting and promotion changed overnight. It improved more in six months than in the past 20 years. Today it's doing great. (If you want a sample copy, write Archibald H. Trench, American Metal Market, 18 Cliff St., New York, N.Y. He'll probably deliver it personally.) The new competitor? Well, to date it's had to stick to its slogan because it's awful hard to find an advertiser in it. That's what competition does.

Once A Hero; Now A Bum: « « Once upon a time there was a man employed by an aluminum firm who took a dive for his boss; went to the clink; later became president of the firm for his help. Things have sure changed. Today if a man tries to pick up a few extra dollars for his firm by fixing prices he gets fined, goes to jail, and gets fired when he gets out. That, at any rate, was what happened to 16 General Electric men who recently were sentenced. The thing that puzzles us is who was in a position to do the firing for GE? It's hard to believe that when so much money is involved the left hand doesn't know what the right hand is doing. The electrical equipment case was unadulterated rigging. No different from the cartels in Europe. But identical pricing is something again. Let a steel, copper or aluminum producer drop prices, and if the industry doesn't follow suit, guess who gets the business. We now read that Kennedy's boys will try to eliminate identical pricing, whether it's illegal or not. We'll venture a guess that before they get very far, they'll find that the big difference between cartels and identical pricing is competition. Let them try it, for instance, on the cigarette outfits or milk producers, not to mention metal firms. Anyway, fellas, if the boss tells you to fix things up a little with another outfit, be sure everyone upstairs knows about it. If everyone gets jugged, there's no one to fire you when you get freed. And if you're a good gin player, you could own the company when you get out. (Next month we'll probably answer the question: "Are the wives of jailed industrialists being boycotted and snubbed?")

Adrian Must Be Sold « « As we mentioned here several months ago, the government-owned Adrian, Michigan extrusion and forging plant was put on the block again just before election time. Three bids were obtained, but apparently all were rejected. It has been announced that the plant will go on the block again "to be sold to someone who can operate it." Even Mr. Kennedy announced from the White House that the plant is to be sold. That's what two administrations before his era also wanted, but no luck. While we haven't any doubt that this plant will be sold if the price is right, it seems to us that our leader in Washington has more pressing problems than to get into the selling of a single plant. Surely he must have someone around who can handle it without his help.

Another Hot Metal Deal? « « It seems that Kaiser Aluminum wants to make a deal with General Motors to transport hot metal from its Ravenswood, West Virginia reduction plant to the General Motors foundry in Reliance, Ohio. On the other hand, it could be that GM wants to make the deal with Kaiser since it already has such contracts with both Alcoa and Reynolds. Could be that GM is anxious to avoid

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possible arguments to the effect that one producer is getting preference over another. This deal, if it goes through, will be the longest haul yet—about 285 miles—for highway trucking hot metal. GM is road testing to see how much heat the metal will lose during the trip. The idea behind the move is to supply molten metal for casting Buick and Oldsmobile motor blocks at Reliance. Anyone else for hot metal?

Foil Oil Can « « A foil-lined, spiral wound can with a special interior folded lap seam, which makes it suitable for holding liquids, shows promise as a quart container for motor oil, says Anaconda Aluminum Co., Louisville, Ky. Claims for the new pack include: It will reduce initial can production costs by 15 to 20%; weighs half as much as black iron cans now used. Sun Oil Co. has sent production quantities of the foil cans along its regular filling lines in Marcus Hook, Pa.; reports that the new cans' test performance was comparable to that of current containers. Anaconda thinks the foil can may someday be a popular container for paints, coatings, chemicals, coffee, etc. But it remains to be seen whether or not it can compete with "thin tin" for the oil can market (see item below).

Thin Tin Moving In « « Substantial amount of the steel industry's new thin tinplate is expected to be used in motor oil and beer cans in 1961, according to the annual report of American Can Co. The firm also disclosed that the thinner material is being tested as a container for 15 other commodities. Thin tin—it's conventional tin plate which has been reduced in gauge by additional cold rolling—was developed to fight aluminum in its own weight division (aluminum is still substantially lighter in weight), and is produced by seven firms, the latest of which is Inland Steel Co. (see MM, Feb. '61, p. 14). Thin tin poses a formidable threat to aluminum's march on the can industry. Claims American Can: "Its introduction was the most significant development in the metal container field in 1960—a major technological advance in the competition among metals in the packaging field." The firm predicts the use of thin tin will expand as the steel industry increases its ability to produce it.

The Bitter and Sweet at Boat Show « « From an aluminum boat merchandising viewpoint, the recent Chicago Motorboat Show left much to be desired. First of all, if it hasn't already done so, the Committee of Aluminum Producers must decide that it is in the boat show business to stay, reserve show space earlier, spend a few more bucks on a choice show location; then go all out on an exhibition area designed in keeping with it. The Committee's booth was handsome enough, but so far out in left field as to cancel the effort. And it's too bad that examples of fine aluminum boat workmanship weren't on display (a cooperative effort ought to be as cooperative as a group can possibly make it). There were far fewer aluminum boats on display at the show than in the past, but they made up for this with quality. There wasn't a wavy aluminum hull to be seen. Kaiser Aluminum and Reynolds Metals sponsored exhibits of small boats made by two distinctly different methods. Kaiser had two boats, one a catamaran, the other a sport runabout. Both employed multiconic hull surfaces, and had people gawking in pleased amazement. What usually attracted them was the graceful curve of the runabout's gunwale, made from roll formed sections welded to the hull—positive proof of aluminum's ability to compete with glass in molded design. Another star aluminum attraction was the Marinette, of Aluminum Cruisers, Inc., Louisville, Ky. This luxuriously appointed cabin cruiser weighed only 5000 pounds—compared with 10,000 pounds in glass or steel, according to George Garcia, president of the company. This firm also showed a stretched-formed, two-piece welded runabout, sponsored by Reynolds. Whether by conical development or by stretch-forming, aluminum has a greatly improved chance to excel in the small boat field.

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LEADING MANUFACTURERS TURN TO GEI FOR SPECIAL SHAPES THAT ARE INTRICATE IN DESIGN, REQUIRE CLOSE TOLERANCES AND HAVE WIDE VARIATIONS IN WALL THICKNESS

After other extruders tell manufacturers it can't be done, General xtrusions often steps in and says, "can do." This is why more and ıore of the nation's leading manufacturers are going directly to GEI ·ith aluminum extrusion projects that call for complicated shapes ·ith critical tolerances and wide variations in wall thickness.

They know that GEI's staff of experienced engineers and precision raftsmen will, routinely and promptly, come up with the answers. An xample is the Class Three hollow shape (six hole extrusion) shown ight. In the past this part, used by a radiator manufacturer, was ex- ruded in half holes and the sections welded together. GEI extrudes it ı a single piece . . . saving time and money. The circular extrusion ·ith V-shaped inside walls replaced a casting, with considerable savings) the manufacturer.

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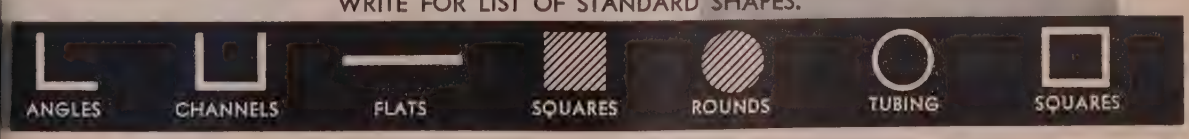

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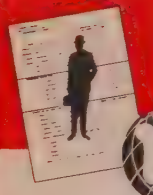

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New Enterprise

The portable welding equipment made by Forney Industries Inc., Fort Collins, Colo., is lighter in weight, and more efficient, says the firm, since it began constructing the welders of aluminum. Front and top of unit cases are aluminum, which is claimed to reduce electrolytic loss. The transformer uses aluminum magnet wire.

To add a distinctive touch to the executive's desk, a **desk set** of polished aluminum is made by Smith Metal Arts Co., Inc., 1721 Elmwood Ave., Buffalo 7, N. Y. Included is daily reminder pad, calendar, list finder, clock, pen, cigarette jar, rimmed blotter.

While finalizing plans to build a new West Coast facility, the Harvill Corp. is trying to buy an unnamed upper Midwestern die cast firm which would give the company an outlet close to Detroit. The Harvill West Coast plant will be built at the corner of Susana Road and Reyes Ave. in Compton, Calif.

William S. Kimbell is directing plant operations of the new Lone Star Aluminum Co. **foil producing plant** in Corpus Christi, Tex. Kimbell is one of the incorporators of the firm.

A new aluminum building product for residential, commercial or industrial uses is a **ventilator** which opens and closes automatically with temperature variations. The unit is equipped with movable louvers controlled by a factory set thermostat, insect screening, and a fusible link which melts in case of fire, automatically closing the louver and stopping air circulation. Thermvent Corp. manufactures the ventilator at 12861 Artesian St., Detroit 23.

A package that does the job of a thermos bottle and sells for only 12 cents has been designed especially for calorie-conscious workers who bring dietary supplements to work for lunchtime. The **foil lined container** holds 8-ounces, and is durable enough to be re-used several times, according to Stone Container Corp., Tulip and Decatur Sts., Philadelphia 36.

A **tube tapering machine** is being installed at Elm Engineering Ltd., Southern Rd., Aylesbury, Bucks, England. The firm manufactures its own aluminum tubing on a high frequency welding unit made by New Rochelle Thermatool Corp., New Rochelle, N. Y.

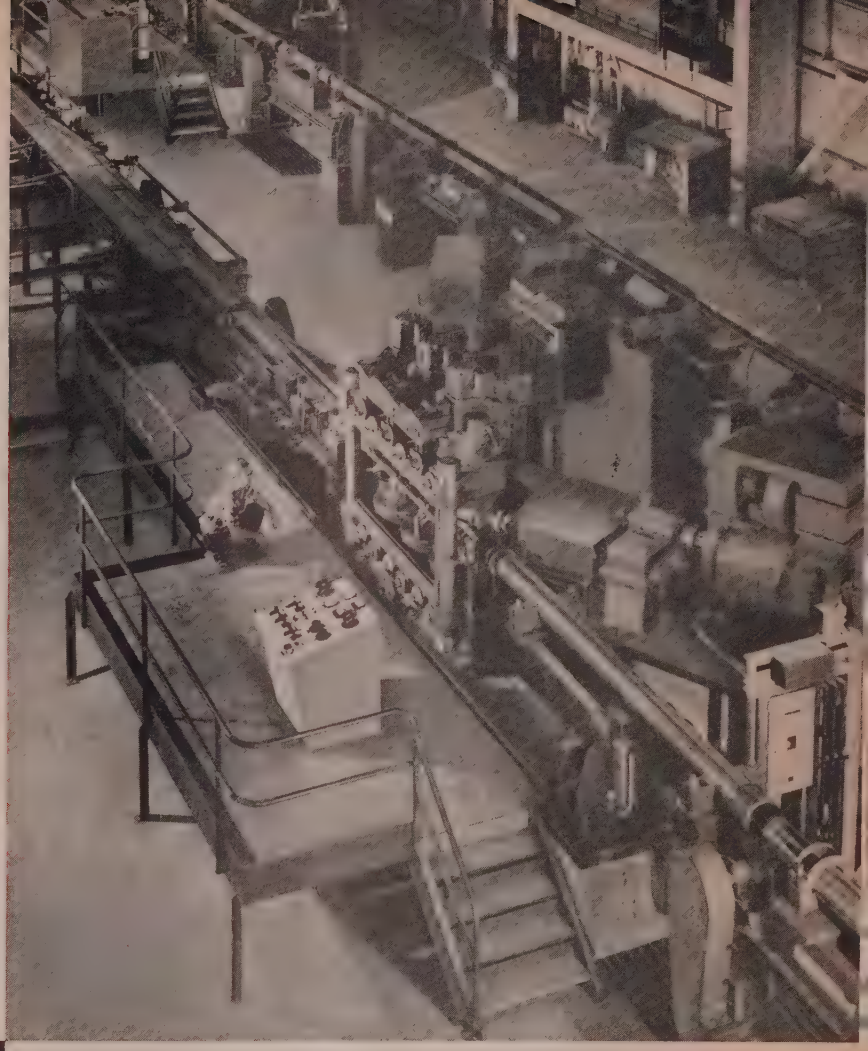
Aluminum is finding wide usage in the manufacture of **baby accessories**, according to Eliot Mover, president of Bunny Bear, Inc., 201 Broadway, Everett, Mass. He says tubular aluminum is used in portable cribs and seats, baby lounges, car seats, etc.

A disposable **ashtray and companion coaster** made of heavy gauge aluminum foil, and selling for about a penny each, have been developed by Anaconda Aluminum Co., Louisville, Ky., as premium and give-away advertising items. Product name or trademark can be embossed in the center of natural or colored aluminum trays.

An extruded aluminum track is used in the Electric Traverse Rod, a new automatic **drapery hanging and control** unit made by Kenney Mfg. Co., 609 Wellington Ave., Cranston 10, R. I. Just push a button and drapes open and close automatically; cords are completely eliminated.

As part of its overall $10 million plant expansion and modernization program, Fairmont Aluminum Co., Fairmont, W. Va., is installing a gas-fired **annealing furnace** made by Swindell-Dressler Corp.,

Why Mack-Hemp straighteners were selected for the world's most modern continuous weld pipe mill



The new continuous pipe mill at Lorain Works of U.S. Steel's National Tube Division is probably the most productive facility of its kind in the world, exceeding the record-breaking pipe mill at Fairless Works.

With straightness and roundness of delivered pipe more critical than ever, the Lorain Works assigns this important finishing task to two Mackintosh-Hemphill 6-roll guideless rotary straighteners. The two can process 1800 feet of pipe per minute. Finished pipe is perfectly straight and round, without spiral markings. "End hooks" at back and front are completely removed. Moreover, the straighteners' open three-post construction makes the rolls readily accessible, so that set-up time is cut to a minimum.

If you're concerned with straightening pipe or tube—no matter what the diameter or wall thickness—it will pay you to talk to Mack-Hemp. We have helpful information for you.

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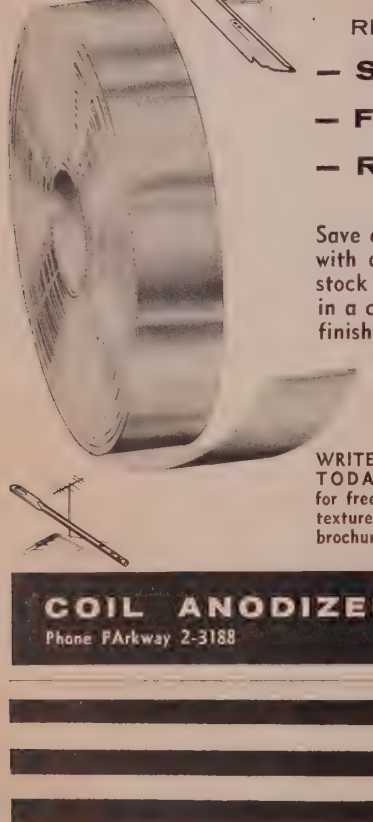

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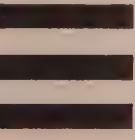

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Pittsburgh. The furnace will have a capacity of 13[illegible] 600 pounds; will acccommodate coils up to 73 inche wide. Furnace foundation is complete, and erection underway.

An aluminum alloy for exterior **automotive trim** has been developed by Kaiser Aluminum & Chemic Corp., and registered as 5252. It has ultimate strength of 35,000 to 45,000 psi and yield strengths of 30,00 to 40,000 in optimum ductility range.

A manufacturer of stainless steel and other types o industrial **fasteners,** Anti-Corrosive Metal Produc Co., Castleton-on-Hudson, N. Y., has been purchase by H. M. Harper Co., fastener maker in Morto Grove, Ill.

A pre-fabricated **floating dock** has been designed fo permanent installation in either fresh or salt water b Vio-Holda Mfg. Co., 844 N. Madison, Topeka, Kan Each 20 by 7-foot aluminum section can support 240 pounds.

A $2 million expansion of its Toronto, Ohio, plan will be completed early next year says Titanium Meta Corp. of America, New York. New facilities are bein constructed for production of **titanium tubing** for non military users — primarily chemical processors. Seamle and welded-and-redrawn tubing will be made in size ranging from ½ to 3 inches in diameter, lengths u to 30 feet.

Cast aluminum **Hibachi cooking grill** made by Pee less Aluminum Products Co., Bridgeport, Conn., ha adjustable grill height, removable top and greas catcher. Canned heat or charcoal can be used in th unit, available in either clear or black anodized alu minum.

The good will, equipment and other assets of Hetzle Foundries Inc., Rochester, New York, have been bough by Antice Co., Inc., Rochester. Aluminum, bronze an iron **castings** will be made in the newly acquired plan at 111 Humboldt St.

Ever hear of a **boat** that flys or floats? By using Rotosail attachment made by Bensen Aircraft Corp Raleigh, N. C., you can do both. Rotosail consists o a large helicopter-type rotor mounted on an aluminu mast which clamps to an aluminum boat. The boa when towed as in water skiing, takes off when to boat reaches an honest 30 mph speed.

Safe stairs in industrial locations are a must. Suc safety can be insured if aluminum or magnesium Shu Site **stair treads** are used, as made by Hendrick Mf Co., 20 Dundaff St., Carbondale, Pa.

Small but mighty **fire extinguishers** have been d signed by Ansul Chemical Co., Marinette, Wis., to b air-lifted by helicopter to the scene of airplane crashe Units consist of aluminum spherical tanks, hose lin aluminum storage baskets and nitrogen cylinders fo pressurization. An aluminum frame holds the entir

(Continued on page 2

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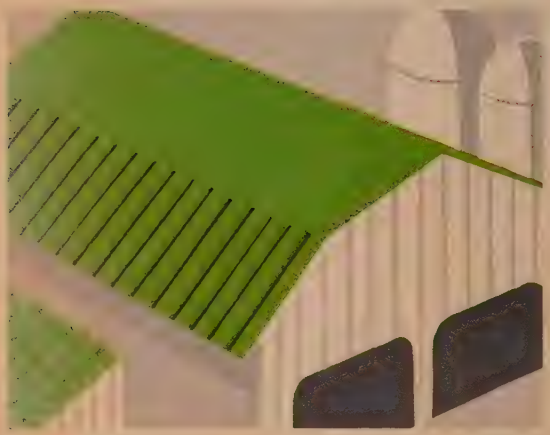

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olling aluminum **service doors,** grills, fire doors, nter shutters, bifold doors and sectional overhead rs are made by Kinnear Mfg. Co., Fields Ave., umbus 16, Ohio.

n extruded **magnesium tube,** made in alloy AZ31C, sed in the last stage of carton manufacturing equip- it made by Mercury Engineering Corp., Milwaukee. e tube, 46 inches long and with a 12¾-inch OD, sed to move and guide cut and creased cartons ough stripping rolls.

swimming pool platform which moves up, down ilts at the touch of a button, to vary pool depth, alled Family Lifeguard by Safety Pool Lift Inc., W. 21st St., Hialeah, Fla. The entire floor is made aluminum extrusions, and anodized with a natural, d, blue, aqua or coral finish.

Aluminum parts and chassis are used in the manu- ure of 2-way Citizens Band Transceiver by Heath , Benton Harbor, Mich. These **communications** ts can be had for fixed station or mobile use.

The formation of a new division called The Hands , located at 4159 Whiteside St., Los Angeles 63, lif., has been announced by H & S Metal Products . The new firm will develop, manufacture and sell **tom castings** for architectural uses.

A cast aluminum **gasoline engine** which represents "total Americanization of the Volkswagen-Porsche ilosophy," and which will have wide application m "automotive to refrigeration," is under develop- nt at Fletcher Aviation Co., El Monte, Calif. Twelve ototypes of the Flair 108 air-cooled, opposed cylinder gine, with self-balancing crankshaft, are under nstruction.

The weather-tight **door frames** made by Wahlfeld fg. Co., 1101 S.W. Washington St., Peoria, Ill., have n-D aluminum combination sills, thresholds and atherstripping. Use of this unit eliminates the need cut sub-floors, chop out headers and floor joists, fit e threshold, nail the weatherstrip and paint the sill, ys the firm.

Aluminum **tube and pipe** made by the Dow Metal oducts Co., Midland, Mich., are being distributed the R. J. Gallagher Co., 1502 Gazin St., Houston, exas. This firm is Dow's first aluminum mill products stributor. Products range in size from ¼ to 10 inches D.

A new line of vinyl grip aluminum **handles** is being fered to equipment manufacturers by TA Mfg. Corp., 07 Alger St., Los Angeles 39. Made to MIL-T-945A, e handles come in grey or black vinyl dip finish.

Porcelain aluminum panels are being manufactured d marketed by Mapes & Co., a division of Mapes dustries Inc., P.O. Box 2067, Lincoln, Neb. Included the line are glazing, veneer and insulating panels.

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This truck type oven is now in service at Penn Extrusion Corporation, Erie, Pa. Close temperature control is maintained through the use of two gas fired, recirculating air heating systems. Other Carl Mayer design features assure trouble-free, economical operation. Write for Bulletin HT-53.

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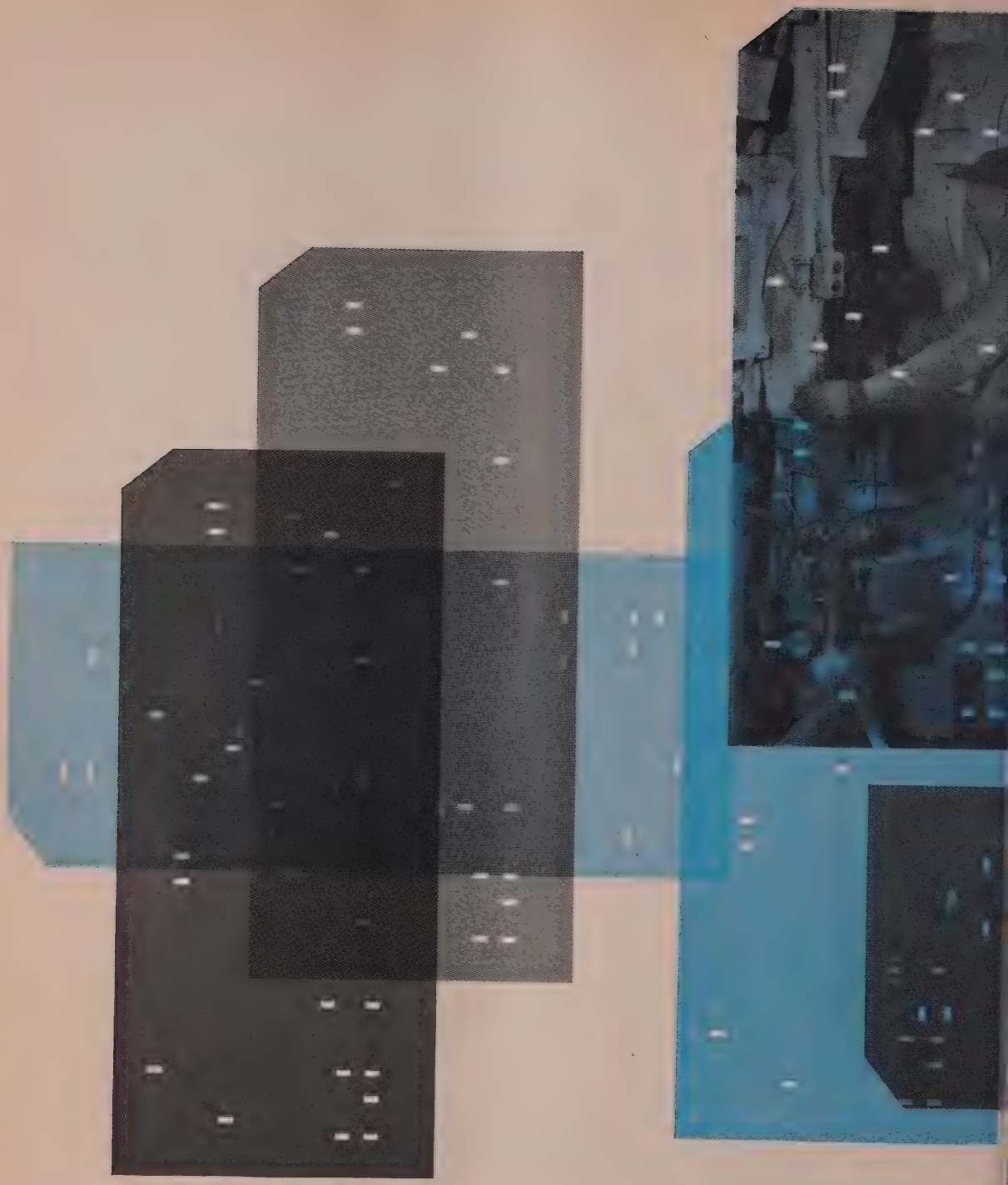

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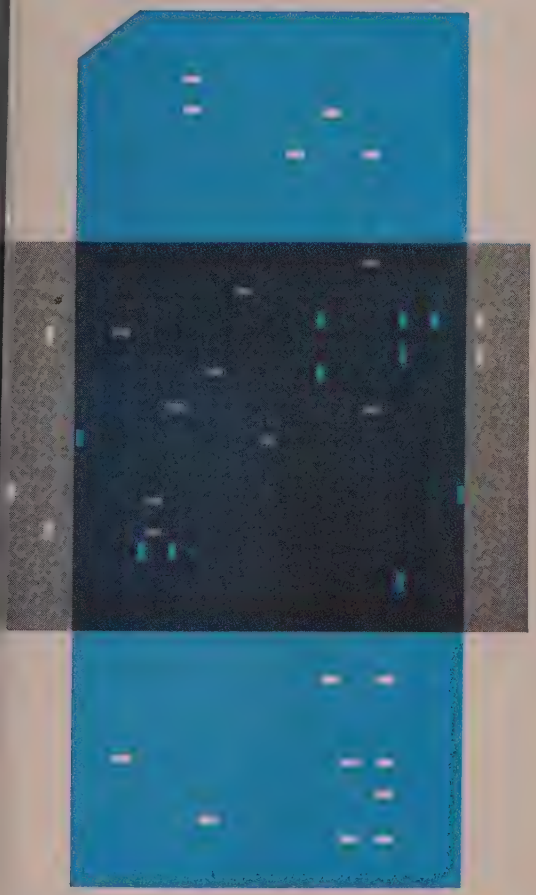

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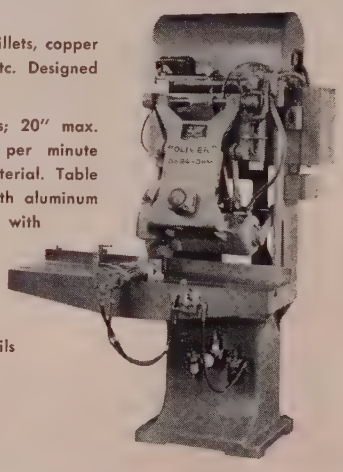

Write for full technical details

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Useful Data

The Vibrocast Process of die casting is detailed in a brochure recently brought out by Southern Die Casting & Engineering, 206 Albertson Road, High Point, N. C. In text and pictures, the brochure shows how sonic waves produced by a Vibrocast unit force entrapped gas from the liquid metal to produce a fine-grained, non-porous casting. Write John Weber.

Roll forming machines designed and built by the Maplewood Div'n of the Rockford Machine Tool Co. are illustrated and described in a new catalog. Beyond this, and the long, illustrated list of roll formed shapes capable of being produced on Maplewood roll formers, the 32-page booklet pictures and describes other metal working machines such as crimping and beading machines, elbow machines, gap gang punchers, and many other types of sheet metal equipment. Write to Phil Elbert at 2500 Kishwaukee St., Rockford, Ill.

Welding, brazing and soldering alloys and fluxes are listed in chart form for quick selection according to the base metal to be joined. This "wall and desk" chart (it measures 19½ x 25½ inches) is a recent new publication of All-State Welding Alloys Co., Inc., and has All-States' complete line of products. Each joining alloy is described in detail with recommended pre-heats, amperage or working temperature, tensile or shear strengths, identification and packaging comments. Table shows correct joining alloy for welding or brazing all major weldable aluminum alloys. Government specs met by All-State aluminum alloys are given in tabular form. Ask Richard H. Mandel for this handy reference piece.

Improved General Purpose Presses are detailed in a new folder, Bulletin 370-F, recently published by the Watson-Stillman Press Div'n of Farrel-Birmingham Co. Inc. Complete specifications and new features of four hydraulic models—30-, 50-, 100-, and 200-ton capacity are given, and a model is pictured. Harry A. Gensken, Watson-Stillman Press Div'n, 565 Blossom Road, Rochester 10, N. Y., will send out copies of this bulletin on request.

Stud driving machines, straightening machines, vertical belt sanders and trim dies made by Service Machine and Supply Co., Holland, Mich., are briefed in a special folder. Machine specs are detailed, units pictured. Ask the sales manager for this folder.

Exterior Wall Products of Aluminum Co. of America are gathered together in a bulletin designated AIA File No. 17-A. It supersedes an earlier reference called "Wall Systems of Alcoa Aluminum." The new booklet, well illustrated, describes Alply Panels, the aluminum-faced sandwich panels of various compositions; 3-D Sheet, Alcoa's decorative, three-dimensional surfaced sheet; Al-Shade Screen, a simple system of enameled components which assemble into a sun

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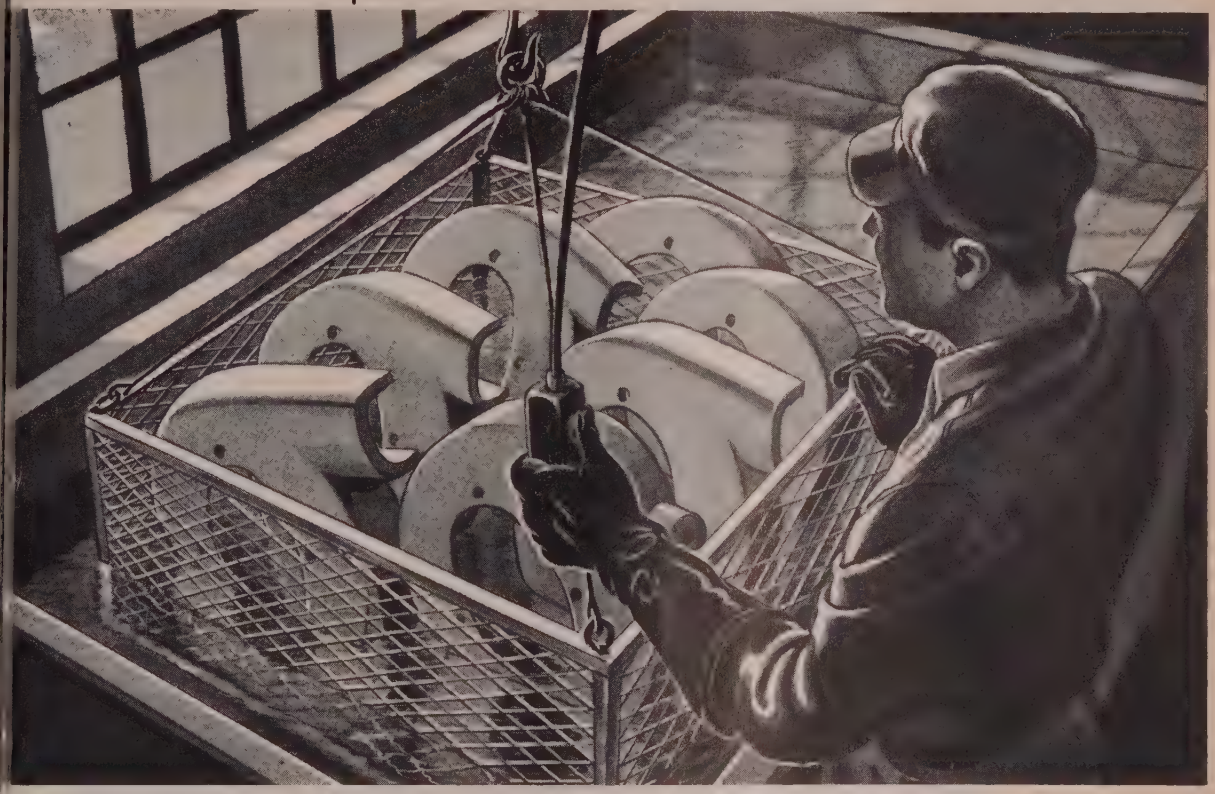

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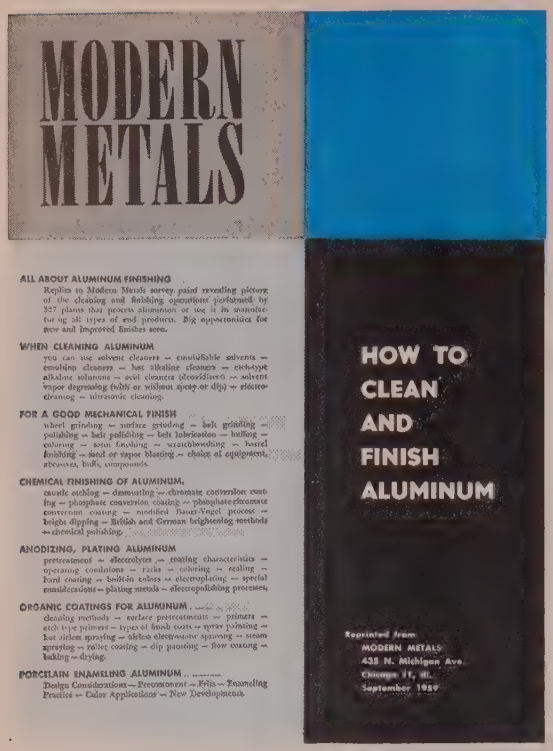

This valuable 36-page reprint is still available at $1.00 per copy in quantities from 1 to 25, and 50 cents per copy in any quantity over 25. To order, simply fill in the form below and mail, with payment, to . . .

MODERN METALS

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screen; and Sol-Dec, a decorative, lightweight aluminum screen system developed to conceal old facades or to create sunshades and vision screens for walls. Ask J. J. Maloney, Alcoa Building, Pittsburgh 19, Pa.

Liquid-liquid-vapor degreasers are described in Bulletin 22 of Phillips Mfg. Co., 3475 Touhy Ave., Chicago 45. Drawings show a two-compartment, three-stage cleaning cycle. The operating principle is explained; complete specifications of standard models are charted. Construction details are also given. Milt Werner will send one of these folders on request.

Thorium pellets, the most economical form in which this radioactive metallic element can be used for alloying purposes, is a product of Dominion Magnesium Limited, 320 Bay St., Toronto, Ont. A technical bulletin describing commercial thorium, its physical properties, pellet sizes, nominal composition and packing, is available from Domal. The booklet also describes its magnesium base 40% thorium master alloy, and has a chart showing typical analyses, and physicals of seven magnesium-thorium alloys. H. G. Warrington will send the bulletin on request.

An Aluminum Use & Data Chart is being offered by United States Steel Supply Div'n. The chart, suitable for wall reference, affords alloy designations both new and old, alloy descriptions, and uses and applications, temper designations, tensile strengths, yield strength, elongation percentages, corrosion resistance, flexibility, machinability, and joining ratings. Write to L. A. Douglas at 208 S. La Salle St., Chicago 4.

A new 28-page, two-color brochure describes the **metal warehousing facilities,** policies, operating practices and services of T. E. Conklin Brass & Copper Co., Inc. of New York. Included are descriptions of the company's unique inventory control system, techniques for rapid handling and follow-up of orders and many other features. The booklet also contains an illustrated section on Conklin's slitting, shearing and sawing facilities. Write to Bruce Conklin at 54 Lafayette St., New York 13.

Deep Drawing Magnesium for Containers, Cases, Housings, a Modern Metals feature on the manufacturing operations of Zero Mfg. Co., Burbank, Calif., has been reprinted. J. M. Dobbie, author of the article and president of Zero, explains why magnesium is a natural for this application and describes the drawing operation in detail. Write to Clayton Dickey, Dow Metal Products Co., Midland, Mich., for a copy of this.

The aluminum siding industry article, published in the January issue of Modern Metals, has been reprinted. The 11-page article also saluted Jerome J. Kaufman, president of Alside, Inc., who was Modern Metals' 1960 Man of the Year. The article discusses roll forming and press braking equipment, conversion and finish coatings, siding manufacturing techniques. Single copies of the reprint are free upon request to Rocky Brown, Modern Metals, 1812 Tribune Tower, Chicago 11.

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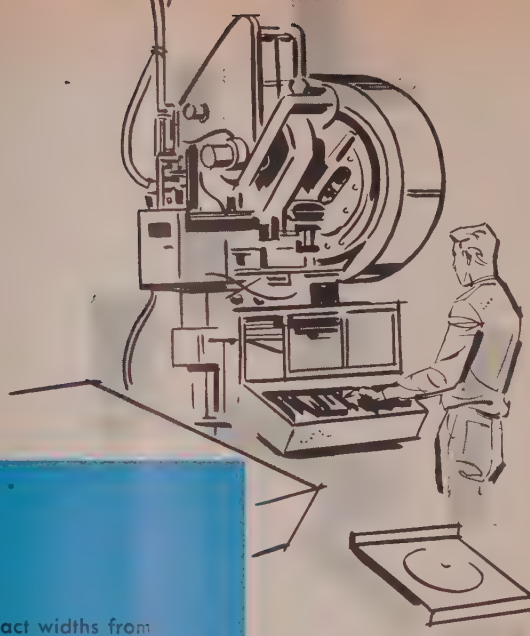

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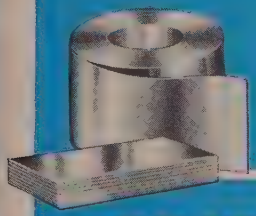

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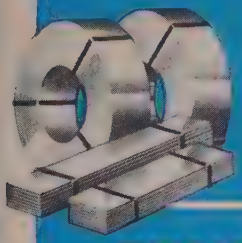

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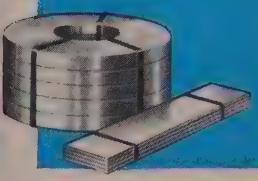

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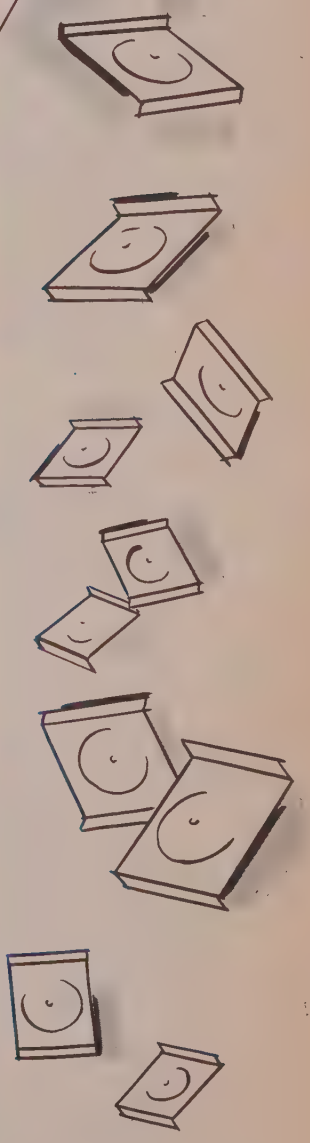

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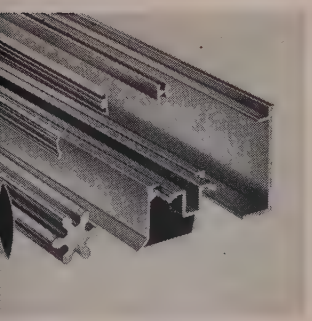

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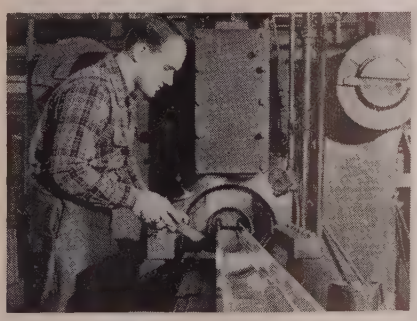

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GEODESIC GREENHOUSE WINS REYNOLDS AWARD

Dome-shaped Climatron uses 50 tons of aluminum extrusions, tube, rod, sheet, castings and fasteners; shows how smart design in aluminum can solve tough architectural problems.

THE R. S. Reynolds Memorial Award, in years past won by foreign architects, this year has been conferred on an American firm, Murphy and Mackey of St. Louis. They were honored for their design of a large exhibition greenhouse in the Missouri Botanical Garden in St. Louis.

Called the Climatron, the unusual structure is an aluminum and plastic geodesic dome which houses collections of tropical plants under closely controlled climatic conditions simulating the natural environments of the plants. It was completed last October.

The $25,000 award, given each year by the Reynolds Metals Co., is administered by the American Institute of Architects. The Institute names a special jury of five of its members to select a winner. The criterion of the competition is: "Design of a significant work of architecture, in the creation of which aluminum has been an important contributing factor."

The four previous awards had gone to architects in Spain, Belgium, Australia and Switzerland.

Described in the simplest of terms, the Climatron is a thin, transparent "umbrella" suspended beneath a dome-shaped frame made of aluminum tubing. Despite its vast size — 60 feet high and 175 feet in diameter, covering about 24,000 square feet of ground — there are no internal supports or unsightly heavy beams to mar the "open sky" effect desired in a showcase for tropical plants. It is probably the closest thing to an ideal greenhouse.

It is also an impressive showcase for aluminum, for it demonstrates how the properties of the metal can be exploited to successfully negotiate a radical departure from conventional architectural techniques. Except for the plexiglass, it is virtually all aluminum.

■ *Photo taken inside the prize-winning greenhouse gives excellent view of its aluminum and plexiglass skin. Missouri Botanical Garden's new structure is called Climatron because of controlled temperatures which simulate climates of four geographical areas. Through skin the dome's aluminum structural frame and suspension frame can barely be seen.*

Dome Within a Dome

Basically, the Climatron is two-interconnected structures — an outer load-bearing spaceframe made up of aluminum tubes, rods and castings; and an inner dome of plexiglass panels set in a framework of aluminum extrusions.

The outer dome is a double-layered hemispherical truss. The two concentric layers are made up of hexagonal units and are spaced 30 inches apart. Extruded aluminum round tubes serve as axially loaded compression members (see sketch, page 36), and bear against the vertexes, each of which consists of two mating cast aluminum halves.

The compression members are 3-, 4-, and 5-inch O.D. extruded aluminum tube, with the largest size used at dome base where the greatest support strength is needed. The four-inch size is used further up in the structure, and the three-inch size at the top.

The compression members are joined to the vertexes by tube and rod fittings of permanent mold cast aluminum. Compression tubes are bolted to fittings at each end. The expanded end of this casting enables the compression member to be locked into place by the bolted halves of the vertex fitting.

The opposed hexagons are trussed into octahedronal (eight-sided) stability by aluminum tension rods which extend from the vertex castings to special hub castings in the centroids of the octahedrons.

One end of each tension rod is threaded to take a locknut which fastens

it to the large hub fitting; the other end fits into a tapered hole in the vertex casting and engages a hole in the permanent mold tube and rod casting (see sketch below).

The hub fittings are sand cast in two halves which are held together by a 1¼-inch diameter cadmium plated steel bolt.

Besides taking one end of the tension rods, the vertex fittings have two other functions. They receive the compression members (as described above), while taking either end of an aluminum hexagon connecting rod, which is approximately 30 inches long.

The vertex fittings in some instances have a fourth function—taking the point connecting cables by which the plexiglass and aluminum skin is suspended.

The result is a lightweight structural truss in the form of a great quarter-sphere. Suspended 12 inches below this truss is the plexiglass and aluminum skin. Since it is point-suspended from the vertex castings, bending stresses are avoided in the truss. This permitted the structural truss system to be designed entirely on the basis of axial tensile and compressive loads.

The suspended dome consists of plexiglass panes set in a triangulated tension grid system made up of extruded aluminum shapes and stamped aluminum vertexes (see sketch, page 38). Total skin area is 33,300 square feet.

The extruded shape was specially designed to mate with the unique neoprene gasketing system that holds the triangular plexiglass panes in place. This gasket can be pried open from the outside so that a damaged pane can be easily replaced.

The stamped pan vertex was designed to adjust to the several vertex angles and dihedral angle conditions involved in the 3-way intersections of the extruded grid members.

How It's Supported

The weight of the tension grid is transmitted to the structural truss by a unique suspension system. Core of this system is a special stainless steel eye-bolt which passes through the two stamped vertex pans and also engages holes drilled into the ends of the six extrusions that terminate at each vertex (see drawing, page 38).

The top end of the eye-bolt is attached to a steel cable, the other end of which is attached to a vertex in the outer structural truss. Thus, the loads imposed by the inner dome are carried through the extrusions directly to the eye-bolts, and thence to the structural truss.

Nuts and special washers are threaded onto the bottom end of the eye-bolts to clamp the two pan stampings together.

At its periphery, the suspended grid is fastened to the main guttering rings which are bent aluminum plate sections spanning each of the five arches at the base of the main truss. At the five points at which these arches intersect, load stresses are transmitted through five concrete pylons to the ring-shaped concrete slab that supports the entire structure. Forty "bents"—eight within each of the five arches—also support the dome structure.

Altogether, some 50 tons of aluminum extrusions, tube, castings, sheet, plate and fasteners went into construction of the Climatron. (This includes the aluminum curtain wall that fills in the five arches at the base.)

Components for the inner and outer domes were fabricated by the Columbus Division of North American Aviation, Inc., Columbus, Ohio. This Division also erected the structure. The foundation was laid by C. Rallo Contracting Co., Inc., St. Louis.

The extrusions and tube were supplied by Alcoa. The vertex sand castings were made by Franklin Brass Foundry, Columbus, Ohio. Permanent mold cast tube end fittings were supplied by Wallace R. Turner Co., Bell, Calif. The vertex pan stampings were produced at the Columbus Division plant.

Many of the fasteners were obtained from local distributors. However, 5300 aluminum hex nuts (2024-T4 alloy) were supplied by H. M. Harper Co., Morton Grove, Ill.

Aluminum is also used for railings, louvers, mechanical system, electrical system, heating coils and other applications.

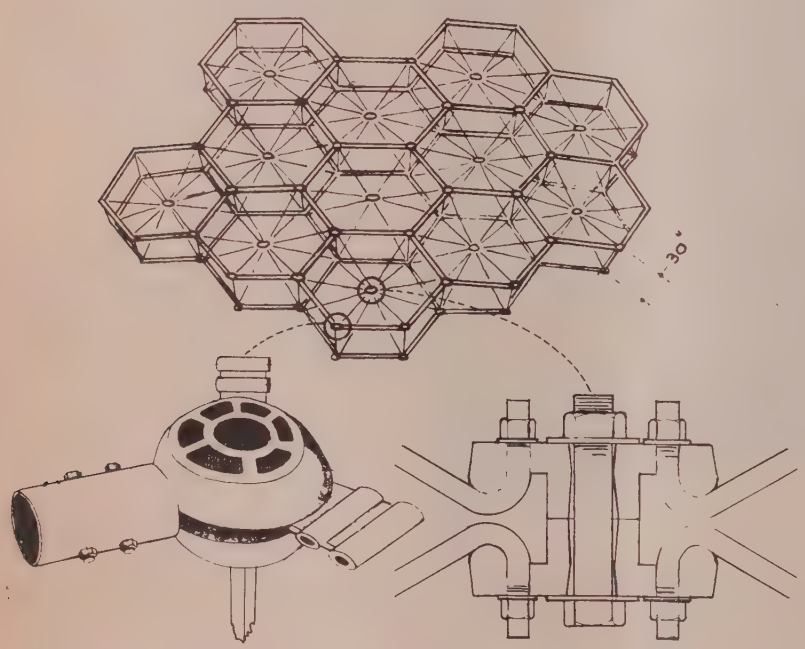
Aluminum Essential Because . . .

Several factors dictated the use of aluminum in the Climatron: An essential requirement for greenhouses is a consistently warm, moist atmosphere which would immediately create a corrosion problem if steel were used. Beyond the desire for a new greenhouse which would be "sufficiently monumental to act as a central theme for the garden," Dr. Frits Went, the director, wanted a structure that would incorporate all recent advances in greenhouse design.

"This meant creation of a largely shadowless interior at very high light intensity," the architects pointed out. "The skin had to be a non-shattering, transparent and permanent material, and be free of supporting structures, yet have the largest possible proportion of high roof area. This is necessary in the full development of jungle trees, palms, giant bamboos and other tropical vegetation."

In view of the 60-foot height of the dome and the tall plant life, mainte-

Details of Structural Truss System



■ *Two vital components of Climatron's frame are vertex fitting (bottom left) and hub fitting (bottom right). Their relationship in the truss design is indicated in top sketch. Drawing shows how tubular compression members (far left) bear against vertex and are locked to it by permold cast tube and rod inserts. Tension rods are not shown attached here. Hub fitting (right) is locked by big center bolt and nut. Ends of tension rods are shown bolted to fitting.*

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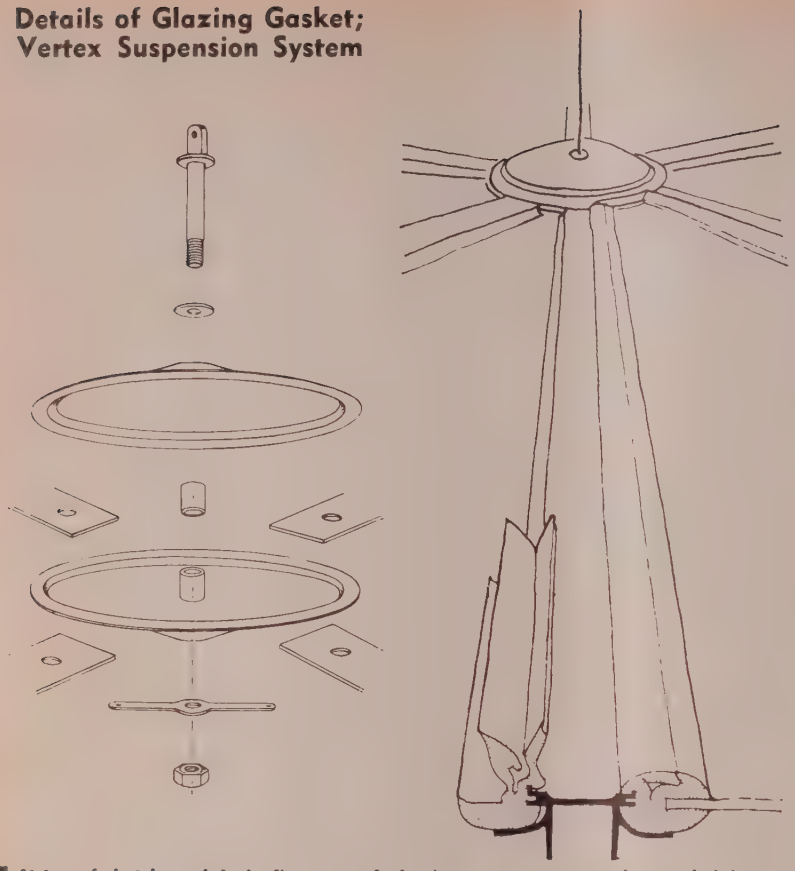
INGOT

Details of Glazing Gasket; Vertex Suspension System



■ *At top of sketch at right is die stamped aluminum vertex pan and extruded frames for triangular plexiglass panes. Exploded drawing (left) shows elements of suspension assembly unit. From top to bottom are the stainless steel eyebolt, neoprene washer, top spacers, bottom pan, top vertex pan, special washer, and nut. Four of the six extruded channels are shown, drilled to take passage of the eyebolt. Details in drawing at right show special locking gasket system for plexiglass panels. Left-hand detail (not fully extended the length of the extrusion) shows unique neoprene channel ready to take plexiglass panel. Right shows plexiglass panel held by closed and locked neoprene gasket.*

nance and repair of the plexiglass paneling from inside is virtually impossible. However, the suspended skin is easily serviced from the outside, where the main structure can be used as a scaffold. Aluminum, then, was all but an absolute necessity for the framework. Even the fasteners are aluminum.

Unique Air Conditioning

The architects consider the dome the ultimate design for greenhouses; believe that in the future such structures will be built no other way. The unique air conditioning system of the Climatron is a principal reason for this view.

"The greatest problem in greenhouse air conditioning lies in the tremendous amount of heat trapped inside an enclosure that is penetrated by the sun's rays," the architects pointed out. "Even with 60 air changes per hour, the air temperature in an unshaded greenhouse will be raised 5 to 10°F in a minute."

Instead of trying to offset this by using even larger volumes of circulating air, this temperature rise — which results from absorption of radiation — is used to create a temperature gradient in the greenhouse.

"Thus the heat trapping problem has been turned into an operational advantage," the architects pointed out. "By installing a second air circulating system at right angles to the first one, advantage is taken of the cooling tendency at night, by creating a temperature gradient in the other direction."

The architects said that since both the radiation heating during the day and cooling through heat conduction in the skin at night are continuous, an even gradient is achieved without partitions inside the structure, producing gradually-varying climates inside the dome. The Climatron's equal dimensions in the directions of the two separate air conditioning systems made this solution possible.

Result is that the Climatron is able to simulate the climates of four distinct geographical areas—Hawaii, India, Java and the Amazon River valley — without physical compartmentation.

The new dome lends itself to spectacular night lighting. Along the inside periphery of the dome are more than one-hundred 1000-watt incandescent lamps. Shielded with reflectors, they throw their light up against the skin, causing the Climatron to glow like a huge incandescent globe.

A second group of lights comprises 24 aluminum narrow angle spotlights in the apex of the dome. They are designed to simulate rotating sunlight and moonglow. The lights make a complete revolution every five minutes — the approximate time it takes to stroll around the Climatron's 550-foot periphery.

The Jury for the 1961 Reynolds Memorial Award was headed by Minoru Yamasaki, FAIA. Others were Hugh A. Stubbins, Jr., FAIA; Henrique E. Mindlin, an honorary Fellow of the Institute; Samuel T. Hurst, AIA; and Paul Thiry, FAIA. Their report termed the 175-foot diameter dome "sensitively executed and strikingly appropriate to its purpose."

The Award winners, J. D. Murphy and E. J. Mackey, are nationally prominent, though their principal works are clustered in the Midwest, for the most part in St. Louis. These include school buildings, churches, public buildings, auditoriums and a low-rent housing project. Both are graduates of the Massachusetts Institute of Technology.

Murphy and Mackey credit Paul Londe, mechanical engineer of St. Louis, and James Fitzgibbon, executive vice president of Synergetics, Inc., Raleigh, N. C., as prime collaborators on the Climatron project. Father of the geodesic dome is R. Buckminster Fuller, president of Synergetics, Inc.

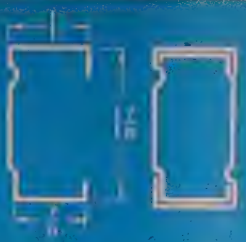
■ *Close-up view of structural system of the skin. Replacement of plexiglass panels which might become damaged can be made only from outside; structural framework makes an excellent scaffold.*

PART: Stiffener for display shelving. Same set of rolls makes both large section (front shelf edge and price moulding) and hat section (middle and back reinforcement).

MATERIAL: CRS 22 ga. (.0296").

STOCK WIDTH: Large section, 7⅝"; hat section, 4¾".

SPEED: 65-90 fpm.

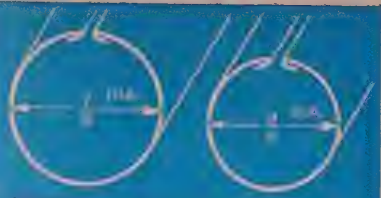


PART: Awning structural support. Used as single members or assembled as a box.

MATERIAL: .051" Aluminum and CRS.

STOCK WIDTH: 4".

SPEED: Approximately, 65 fpm.



PART: Slats for home motion picture screens. Two sizes, run continuously with automatic cut-off.

MATERIAL: 24 ga. CRS, pickled and oiled.

STOCK WIDTH: 2.875" for ⅞" diam. tube; 2.500" for ¾" tube.

SPEED: 60-90 fpm. depending on lengths cut off.

PART: Table slide hardware, telescoping sections.

MATERIAL: 18-20 ga. CRS (.045" and lighter).

STOCK WIDTH: Outer, 2¼"(run on machine auxiliary side); inner, 2" (run on inboard side).

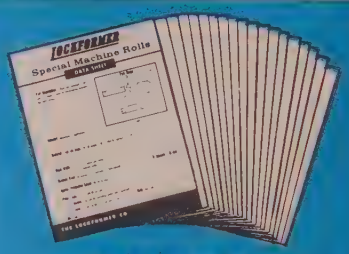
SPEED: 90-95 fpm.

PART: Sign and display backframe. Formed section serves as hinge for access to electrical p

MATERIAL: 20 ga. CRS.

STOCK WIDTH: (Sheet edge operation).

SPEED: 60-65 fpm.



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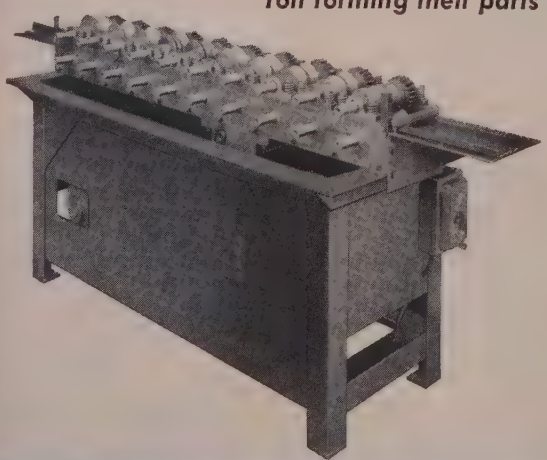

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Boeing Uses Advanced Techniques in Sand Casting Turbine Engine Parts

Use of Olivine molding sand and CO_2 coring process typify Boeing Aircraft's progressive approach to aluminum sand casting in the production of small gas turbine engines.

by K. B. Rhodie, Associate Editor

PROPELLING land, sea and air craft with power plants smaller, speedier and more efficient than existing units is the never-ending task of engine designers. One of the more successful advances resulting from this quest is the small gas turbine engine.

A 17-year veteran in gas turbine development is Boeing Aircraft's Industrial Products Div'n in Seattle, Wash. In explaining why the small units have been successful, the firm points to their light weight, compactness, torque-converter characteristics, low noise and vibration, flexibility of control, ability to operate on all common grades of fuel and oil, and reliability and suitability for all-weather operation.

An outstanding facet of a turbine is its simple operation: The engine draws in air from the atmosphere, compresses it, heats it by burning fuel in the compressed air and harnessing the force of these hot gases to turn a turbine wheel which produces the usable horsepower.

Boeing makes two series of gas turbines — one in production, the other still being tested. All of its turbines are two-shaft engines which give the powerplant a built-in torque converter characteristic similar to that of a fluid transmission. This enables the turbine to provide excellent low speed performance for acceleration and hovering.

Engines in the 502 series — in production — are composed of a single-stage centrifugal compressor, two straight-through combustion chambers, and two axial turbines. Units in this series offer 240 to 360 shaft horsepower with a specific fuel consumption as low as .89 pounds per horsepower hour.

The second group of engines — the 520 series under test — provides power ratings ranging from 375 to 550 horsepower. This series was designed to provide lightweight power plants for helicopters and business aircraft as well as surface applications encompassing everything from freight trucks to fire boats.

Units in the 502 series have already seen many land and sea applications, and through use of a Boeing-designed compressor section coupled to the output shaft, the engine is able to deliver 205 air horsepower for flight use.

This compressor also supplies low pressure air for starting jet engines and checking the extensive pneumatic systems of large jet aircraft. Also, a radio-controlled, high-altitude aerial target utilizing the 502 is now under development for the U. S. Army.

Since Boeing began small turbine development, performance coupled with low cost manufacturing techniques has been its objective. According to Boeing, "due to improved production methods, gas turbine costs are down to a competitive level with gasoline and diesel engines produced in similar quantities."

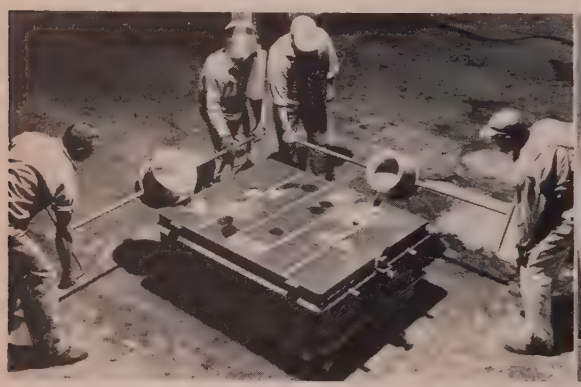
Part of the success of this low-cost quality performance hinged on Boeing development and engineering of its ow aluminum sand casting foundry alon the Duwamish Waterway in Seattle.

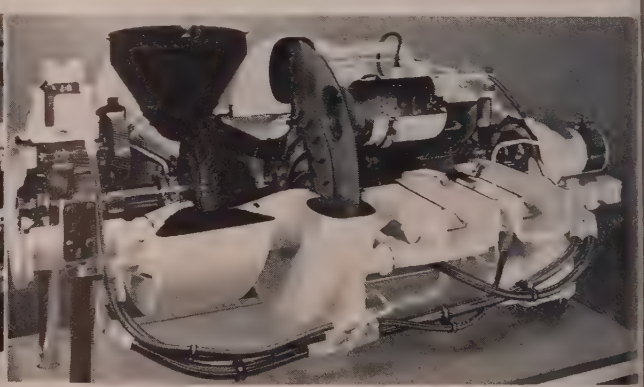
This 10,000-square-foot shop is divide into four major areas: Pattern shop molding; coremaking; and trim an grind area. Heat-treat, X-ray, penetran inspection, physical test and dimensiona inspection are located in other areas.

An average of 12,000 pounds o trimmed castings a month are produce by the foundry's 32 employees, workin two shifts. As of now, olivine and dr sand molding are used, but experimenta work is being carried out on shell, per manent mold, investment and plaste mold casting.

The use of olivine molding sand ind cates the thoroughness with which Boe ing studies manufacturing methods. Thi is the olive-colored material, found i abundance in the firm's home state. Th University of Washington started t experiment with this material in 195 It saw only limited use in this countr as recently as 1958.

Olivine's proven advantages as a bas for a synthetic molding material in clude its ability to produce excellen as-cast surfaces, eliminate finishing ope ations, reduce rejects and speed castin production. Physical properties hav been determined to be: Mohs hardnes range, 6.5-7; specific gravity, 3.27-3.3 and P.C.E. value in the 34-35 range





■ *Foundrymen are pouring molten aluminum into sand molds to make parts for the 520 gas turbine shown at right. Engine components are (from right): Double-entry single-stage radial compressor; above it one of two combustion chambers; in center, single-stage radial turbine which drives compressor. At left, single-stage axial-flow power turbine coupled to reductio gearing which produces usable horsepower. Gases are ex hausted directly above power turbine.*

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Rolling on a PITTSBURGH Breakdown Mill at ANACONDA ALUMINUM

As a major part of an extensive expansion program at its Terre Haute, Indiana plant, Anaconda Aluminum Co. has installed this PITTSBURGH 66-inch four-high cold rolling Breakdown Mill. This equipment produces aluminum strip with a minimum thickness of .012" up to 60" wide at a speed of 1,200 feet per minute to help meet the increasing volume of orders specifying exacting gauge tolerances and surface quality. The mill also produces foil stock for Anaconda Aluminum's Foil Division at Louisville, Kentucky.

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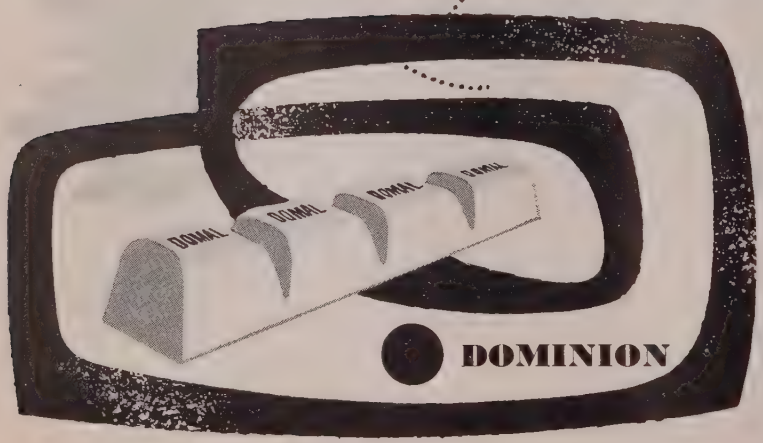

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uivalent to a fusion temperature of proximately 3200° F.

Other important advantages of oli- ne: It contains no serpentine, which counts for its high fusion temperature; contains no free silica, hence cannot use silicosis disease.

Metal is melted in Lindsey induction rnaces and a 400 pound Stroman gas- ed crucible furnace. All crucibles are eheated from 1400° F to 1500° F and ouring temperatures are closely con- olled at the furnace and during trans- r to the molds. Castings are hand- oured from 60 or 100-pound crucibles.

Patterns are made of mahogany for perimental castings, plastic for pro- uction work, and aluminum for close lerance castings.

Patterns for the small gas turbine ngines are complex and require exten- ve coring to minimize weight. Wall ctions are held to .150-inch, ± .020 nch. Wall section tolerances become xtremely critical when cores are re- uired to form both inner and outer all surfaces. Tolerances on several en- ne castings are held to ± .015 inch.

ores Made by CO_2 Process

All cores are made by the speedy, onvenient carbon dioxide (CO_2) proc- ss (see MM, April '60, p. 50). It's fast ecause the foundry cores can be ammed or blown using conventional ethods, then hardened right in the ore box. This eliminates the need for ngthy oven baking. The CO_2 process convenient because it reduces han- ling and doesn't require the large stor- ge areas conventional processes do.

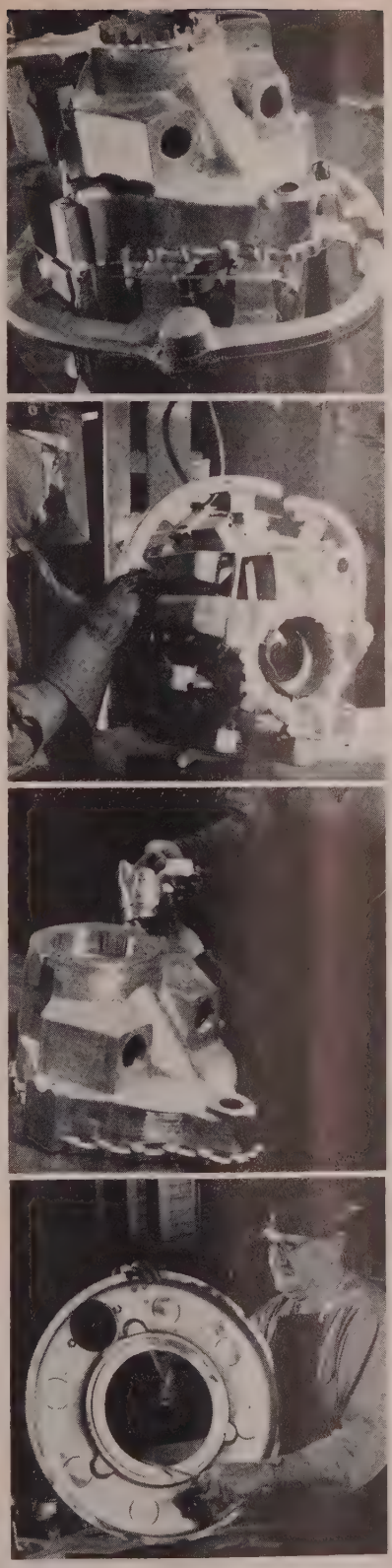
Cores are made with a highly-collap- ible prepared sodium silicate and 100 A.F.S. silica sand. Production cores are nade on a core blower or core shoot nachine, while those for experimental astings are made by hand.

In the molding process, southern and western bentonites are the clay addi- ions. No cereal or other binders are dded to the sand, except for special acing sands.

The moisture content is maintained etween 2.8% and 3.2%; permeability s held between 70 and 80; green com- pression strength is approximately 8 to 9 psi. Molding sand is closely controlled by tests performed at regular intervals throughout each day. Grain fineness and clay content tests are carried out pe- riodically to determine grain distribu- tion and content.

All gas turbine castings are made to aircraft specifications QQ-A-601 and MIL-C-6021. Alloys used include 356-T6, 142-T571 and A140-F. Chemical analysis is closely controlled from ingot through the finished casting.

Rigid quality control is a must at Boeing, the firm says. Besides the regu- lar inspection process, a close control is maintained on internal casting quality through use of an extensive X-ray opera- tion. All experimental castings as well as production samples are X-rayed to assure internal integrity.



■ *Casting (top), with gating attached, is reduction unit output housing for 400-hp engine. Gating is removed (next photo), and casting trimmed (third photo). "Eyes" are engine's accessory pads; casting's internal configuration requires 9 cores. Compressor case is trimmed in last photo.*

The simple working principle of a turbine requires a myriad of complex parts. In dismantling a Boeing 430-shaft-horsepower 325-pound engine you find 26 aluminum castings, weighing from 0.1 to 18 pounds, and totaling 88 pounds.

Casting was used to make everything from simple bearing retainers to close tolerance lubrication pumps and large compressor inlet housings with a wall thickness of 0.150 inch. Castings for the engine's accessory drive and gear reduction housings were made from complex core assemblies which provide cast-in oil passages.

Turbines could become a healthy market for aluminum if the mighty little units see the wide use expected.

William B. Anderson, Industrial Products program manager of development engines, puts it this way: "The small turbine is versatile to a degree never achieved by any other type of engine. This characteristic indicates that its potential field of application is very broad."

So far Boeing's small gas turbines have successfully powered helicopters, locomotives, boats, racing cars, earth moving tractors, fog screen generators and electrical generator drives. A turbine was also applied to a highway freight truck, which became a test-bed for the unit. It powered the truck 60,000 miles over mountains and desert, through snow, rain and heat.

Also, a Boeing 502-8B turboprop engine, in mid-1953, elevated a Cessna XL-19B to an altitude of 37,063 feet — a record for light airplanes.

First order for the 502 turbine came from the U. S. Navy Bureau of Ships. About 250 engines were built to drive generators on minesweeping boats.

Navy 1000-hour endurance tests with the 502 engine proved the turbine could operate in the field for 1000 hours between overhauls. This meant that a turbine-powered 36-foot landing craft could travel 9000 miles between overhauls.

Boeing claims that an automobile with the same 502 engine could run at more than 100 miles an hour for 100,000 miles before overhaul.

The versatility of the small unit has been proven by its varied application to date. And though these applications have required comparatively few engines, Boeing sees the time in the near future when turbine-powered trucks, fire engines, tractors, boats, small helicopters and light planes will be a common but important part of the everyday travel scene.

How to get the most out of

6063 EXTRUSION ALLOY

√ Influence of composition
√ Homogenization: What it does
√ Air quench at the die
√ Artificial ageing

by M. E. Molitor and H. E. Miller

Kaiser Aluminum & Chemical Corporation

ALUMINUM alloy 6063 is a heat treatable, precipitation-hardening alloy developed exclusively for the extrusion industry. Alloy 6063 was developed to obtain an alloy that could be heat treated by die quenching at the press with forced air or water spray. Other factors considered were clear anodizing, ease of extrusion, and moderate strength.

The factors affecting the mechanical properties of 6063 are:

1. Composition
2. Homogenization
3. Reheat temperature (heat treat)
4. Extrusion quench rate
5. Ageing time and temperature

To understand the basic metallurgical concepts, it is necessary to refer to the phase diagram which is one of the metallurgical tools used in evaluating aluminum alloy systems. (see Fig. 1).

Magnesium and silicon, the main alloying elements in 6063, combine to form magnesium silicide (Mg_2Si) compound. This compound acts much like a separate element and is evaluated as such metallurgically. Figure 1 shows the aluminum-rich portion of the aluminum-magnesium silicide phase diagram. We will use this schematic diagram to explain how the five major factors affect the mechanical properties.

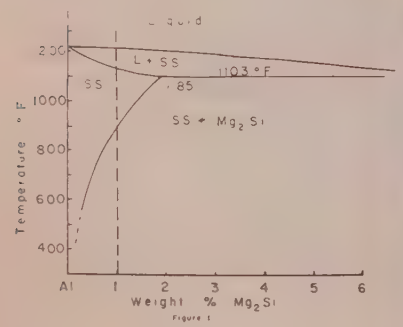
COMPOSITION: Referring to Figure 1, the nominal composition of 6063 would be in the region of the dotted line. This would represent .40 silicon and .68 magnesium. The theoretical amount of magnesium that will unite with the silicon to form Mg_2Si is determined by multiplying the silicon content by 1.7. This figure is predicted on 100% of the silicon and magnesium uniting to form Mg_2Si. In actual practice this is not true since a certain amount of these elements will unite with other elements present such as iron before Mg_2Si is formed.

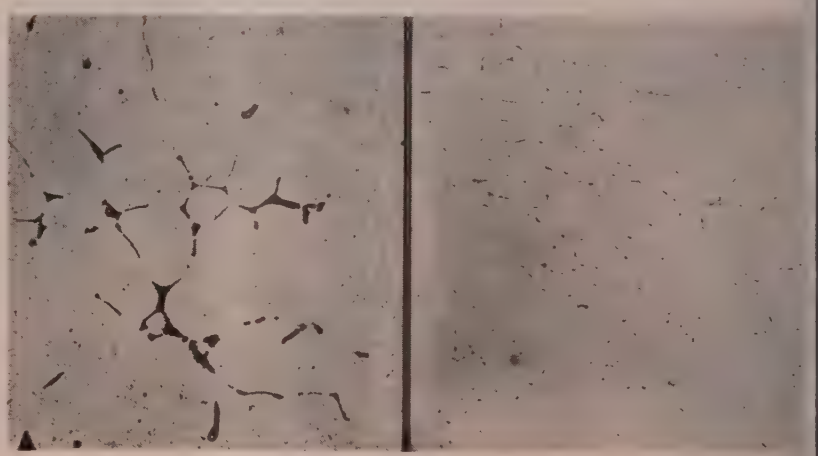
Therefore the 1.7:1 relationship is only a rule of thumb to be used as a guide. If we raised the silicon to .50 and the magnesium to .85 we would move to the right. This would have the result of raising mechanical properties, while the opposite effect would be obtained by lowering the silicon to .30 and the magnesium to .51.

HOMOGENIZATION: The effect of homogenization can best be illustrated by referring to Figure 2 which shows the photomicrographs of as-cast and homogenized billet. In the as-cast material the Mg_2Si is large and unevenly distributed throughout the grain. The grain boundary, which is the last to solidify, will be rich in Mg_2Si. Even with the very fast cooling afforded in the D.C. process, the same type of structure is obtained.

In this state, the structure does not lend itself to the efficient fabrication of a quality product. In order to equalize the composition of the as-cast grains, we must heat the structure to the temperature where the Mg_2Si becomes soluble in the solid aluminum. The combination of increased temperature and solubility will allow the Mg_2Si to diffuse in the solid aluminum back toward the center of the grains and equalize the composition of the grain from center to edge.

Since no reaction proceeds instantaneously sufficient time must be allowed for diffusion to take place. The resultant structure is known as being "homogene-





■ *Fig. 1. Phase diagram system, aluminum-magnesium silicide. Fig. 2, photomicrographs of as-cast (left) and homogenized billet.*

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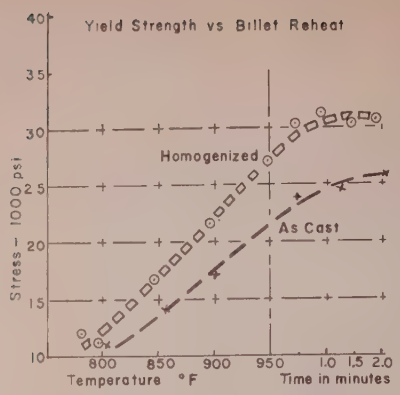


■ *Fig. 3. Effect of billet homogenization on mechanical properties of 6063 extrusions. (Aged at 350° F for six hours; cooling rate 200° F/minute.)*

ous" or "homogenized." The effects of homogenization can be observed microscopically as seen on the other half of Figure 2. The effects of homogenization are realized in the extrusion process by increased extrudability and mechanical properties along with improved surface finish. The increase in mechanical properties afforded by homogenization is demonstrated in Figure 3. The metal structure in the homogenized condition is now ready to fabricate.

PREHEAT AND QUENCH. We have mentioned the fact that 6063 alloy was primarily developed for the use by the extrusion industry in that desired mechanical properties could be developed by solution heat treating during the extrusion process. This factor eliminates the need for expensive heat treat furnaces and the additional handling operations which may damage or stain the surface of the extrusion.

In our discussion of the phase diagram (Figure 1) we have shown that 6063 alloy is heat treatable by virtue of the fact that the Mg_2Si becomes more soluble in the solid state as the temperature is increased. Conversely, this solid solubility decreases with decreasing temperature.

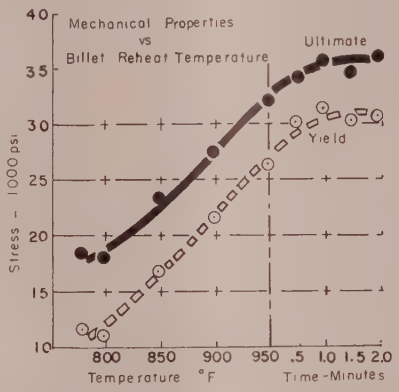
Air Quench at the Die

By heating 6063 alloy along the dotted line into this zone of increased solid solubility and by allowing sufficient time, the Mg_2Si is dissolved in the aluminum structure. If this alloy is then quenched to room temperature from the solid solubility temperature at a very rapid rate, we have robbed the Mg_2Si of the thermal energy it needs to come back out of solution according to the phase diagram and it becomes trapped in solid solution.

If this alloy is to be heat treated at the press, then the billet preheat becomes our solution heat treatment and the extrusion air cooling becomes our quench. Since the preheat is an integral part of the heat treatment, it must have a considerable bearing on the final mechanical properties. This relationship is pointed out in Figure 3. All the data presented in this report is based on induction heating of billets prior to extrusion.

The second, and still very important, step in the press heat treatment process is the quench. The rate at which the extrusion is cooled from the solution temperature determines the amount of Mg_2Si which is retained in solid solution. A slow cool from solution temperature will allow most of the Mg_2Si to precipitate and the extrusion will not respond to subsequent aging treatments to produce the desired mechanical properties.

The amount of air and the velocity of application needed to provide adequate quench will vary from shape to shape. A general rule of thumb for quenching 6063 alloy to produce the -T4 or -T6 temper is to cool at a rate of 100°F per



■ *Fig. 4. Relationship of mechanical properties of extrusions to billet reheat temperature.*

minute down to 400°F and continue to cool to room temperature at approximately 50°F/min. If the final temper desired is -T42 or -T5, this cooling rate may be somewhat slower, but not less than 50°F/min. down to room temperature.

Alloy 6063 differs in its ability to be heat treated at the press from other aluminum alloys mainly in the speed of quench required. Alloys 6061 and 6062 require that quenching must proceed at least five times faster than for 6063 alloy. This rate of quench is based on the amount and type of constituent which must be trapped in solid solution. Alloys 6061 and 6062 have a nominal 1.7% Mg_2Si while 6063 alloy has a nominal 1.00%. (See Figure 4). 2024 alloy requires an extremely fast rate of quench predicated mainly on preventing the precipitating constituent ($CuAl_2$) from coming out of solution and forming at the grain boundaries. This not only reduces the mechanical properties but destroys the alloy's resistance to corrosion.

PRECIPITATION HARDENING (AGEING). Immediately following press heat treatment of 6063 alloy, the structure is in a highly strained or unstable condition. The Mg_2Si is trapped in solid solution, but at room temperature the aluminum structure must enlarge slightly to retain it. This condition is called "supersaturation" or a metastable state. At this instant there is enough energy left in the structure to allow some rearranging of the Mg_2Si in the aluminum structure. The Mg_2Si tends to migrate toward certain preferred spots in the aluminum structure.

To Reach -T5 or -T6 . . .

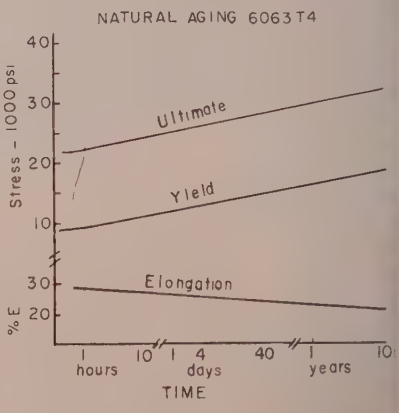
If mechanical properties were determined at intervals of time after extrusion, one would find a more rapid increase in the first 48 hours followed by a gradual increase over a period of years. The degree of increase in yield strength is normally 2,000 psi. to 3,000 psi. in the first 48 hours and the total increase over a long period of time will seldom exceed 5,000 psi. (Figure 5). This initial increase in properties at room temperature is known as "room temperature" ageing, but is not capable of raising the properties to the desired level for the -T5 or -T6 temper.

The step necessary to increase the property level of 6063 alloy to the -T5 or T6 temper is by ageing at a slightly elevated temperature known as "artificial ageing" or "precipitation heat treatment." A brief discussion of what is taking place on an atomic scale may explain this step.

Every metal can be represented by the unit cell which is the basic building block of its atomic structure. Cell construction will differ from metal to metal; however, aluminum is identified by a "face centered cubic" arrangement of atoms.

If this unit cell were distorted by some outside force, it would change shape in

■ *Fig. 5. Chart shows the change in mechanical properties during various time intervals.*



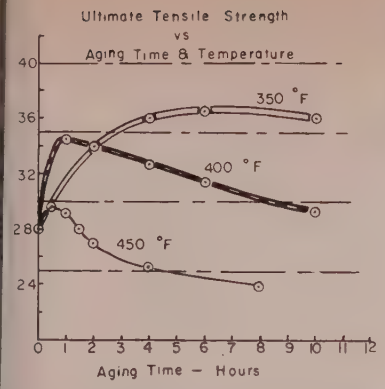


Fig. 6. Ageing time and temperature it affects yield strength of 6063 alloy.

e direction of the applied force by pping along the plane of the cube at contained the most aluminum oms. In aluminum this would be a ce diagonal with a total of six atoms. When ageing or precipitation takes ace, the Mg_2Si atoms tend to migrate these planes and form clusters, thus nding to block any slip along this ane, consequently making the material onger. This has been substantiated by oth X-ray and electron microscopic udies. These clusters of precipitating oms have been measured in alloys ntaining copper (such as 2024) and und to be about 10^{-6} cm. in diameter.

Watch Time; Temperature

If the temperature of the ageing eatment is increased and/or the time temperature is extended, the Mg_2Si usters grow and will be rejected from ne aluminum structure and consequently lose their effect to prevent slip within ne unit cell. This loss in mechanical roperties is called "over-ageing" or relief." At this stage the Mg_2Si clusters an be observed with a microscope.

Figure 6 shows the relationship of geing time and temperatures on the ield strength of 6063 alloy. By knowing ne effect of time and temperature on ne mechanical properties, one may es-ablish proper ageing practices to ob-ain the desired properties for the T5 or -T6 temper.

The purpose of this paper has been o present some of the metallurgical actors which affect the mechanical prop-rties of 6063 alloy. In presenting these actors we have demonstrated the use of ome of the basic tools of metallurgy uch as the phase diagram and the atom-c structure of the unit cell.

Through the use of these special tools, ome of the theories and practices con-erning the processing of 6063 alloy an be explained. It must be emphasized hat for the elementary nature of this aper, many details have necessarily een left out, but the major factors have een discussed.

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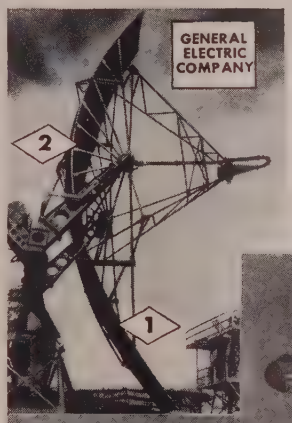

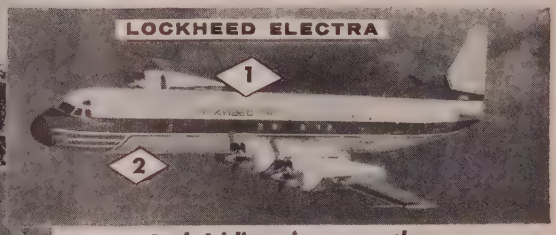

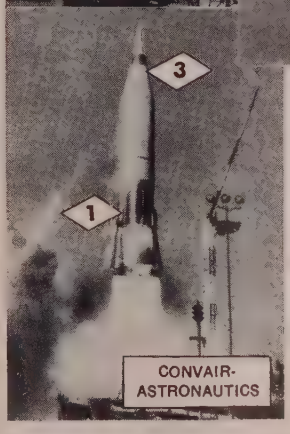

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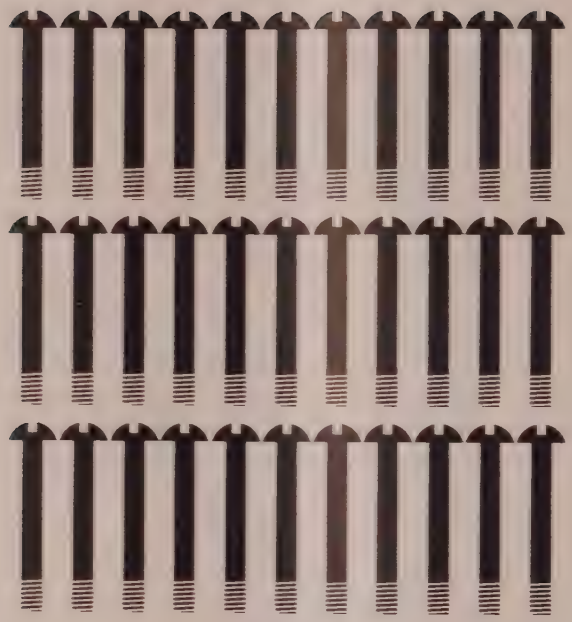

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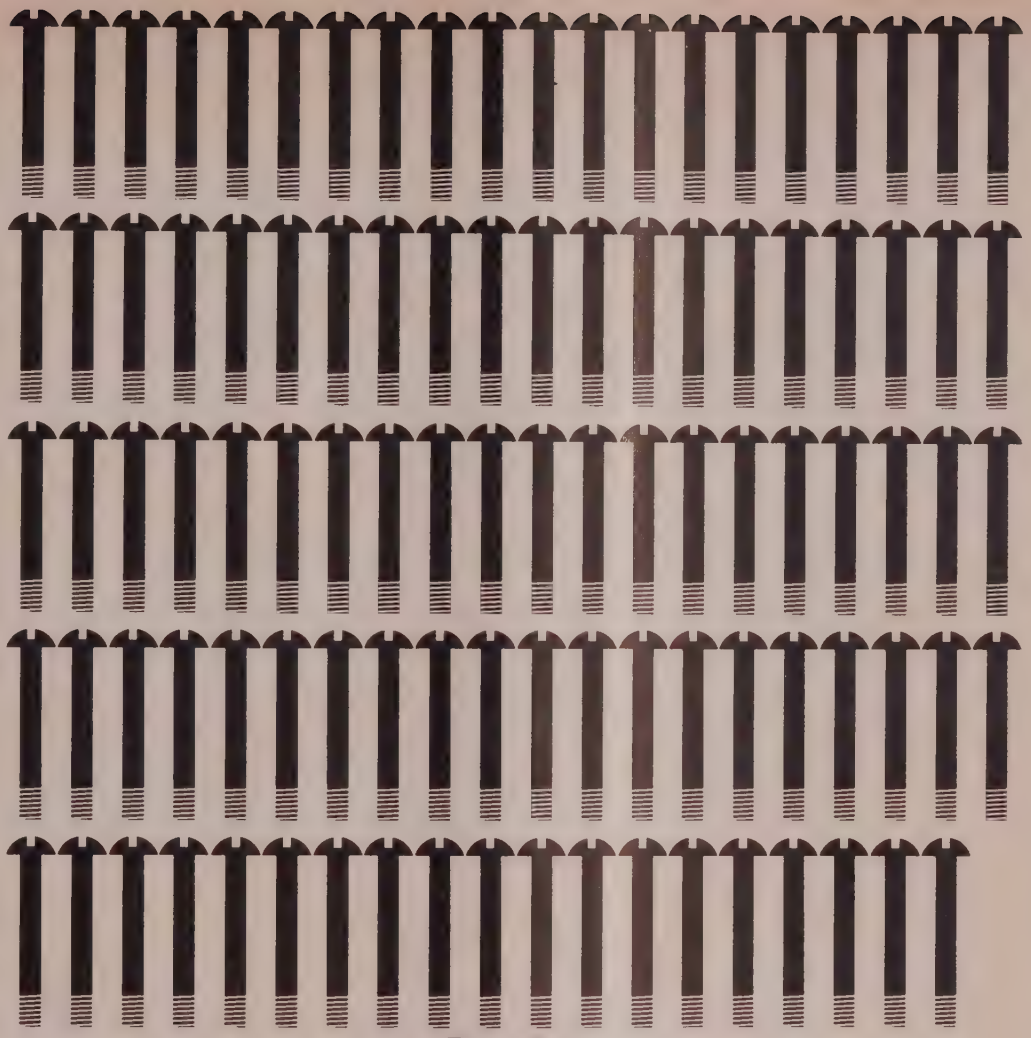

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Schill Steel Co. of Tulsa
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P.O. Box 1173
CIrcle 5-9541

OREGON
Portland 10
Gilmore Steel Co.
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CApital 8-9511

PENNSYLVANIA
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North American Brass & Copper Inc.
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Architect Advises Aluminum Industry

- Don't copy other materials' design principles
- Create new, unorthodox structural forms
- Develop better finishes with permanent colors
- Encourage designers to think aluminum
- Work together for higher industry standards
- Adopt standardized nomenclature

by Philip Will, Jr., President, American Institute of Architects

(From speech given at Aluminum Association-sponsored celebration of aluminum's 75th Anniversary, at Oberlin College.)

WE ARCHITECT'S are interested not solely in the "how" of construction technology, but in the "why," as well. We bear the responsibility for seeing man-made human environment whole. We must back away from what is built to see it in perspective, to see the relation of one part to another, to measure the total result against man's highest aspirations.

For that part of man's environment which is building, we still measure in terms of the ancient words of Vitruvius: "Commodity, firmness and delight." In modern language: Social purpose or function, strength and permanence, and beauty. It is in such a context that we examine aluminum as a still new addition to our already rich palette of materials.

Your speaker has warned the sponsors of this gathering that if we are met in sweetness and light simply to blow a happy note on an aluminum public relations horn, they have invited the wrong boy.

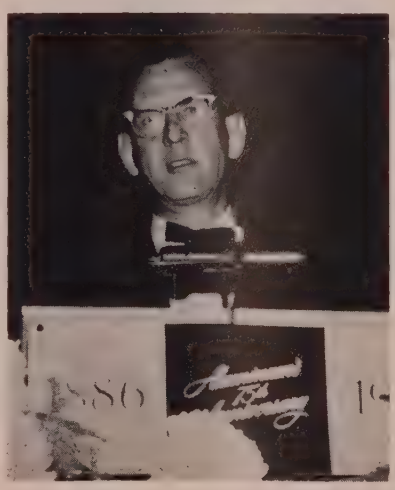
About 1929 a friend of mine, a young architect recently graduated from school, had become fascinated with the possibilities of prefabricating houses and had visions of a superior product spilling off the end of a production line. He wished to use the most modern marketing methods, industrial techniques and materials. His study led him naturally to a consideration of metal wall panels which, in turn, led to aluminum. It seemed to have the fundamental characteristics he sought.

Somehow my friend managed to make his way into the New York office of an official of the Aluminum Co. of America, where he presented his story. The official's response, as my friend remembers, ran something like this:

"Young man . . . the only known use of aluminum in construction today is a casting which forms the peak of the Washington monument. This is probably the last use. I suggest that you are wasting both your time and mine."

Well, I sense that in recent years there has been a change in attitude by aluminum people toward building. While my friend might have to demonstrate that his idea would use many pounds of aluminum, he would certainly get a hearing today.

Since his visit to Alcoa in 1929, aluminum has come a long way. From paint and pre-war edge mouldings and storefronts, we now have complete structures which sit on the ground, roll on wheels, fly in the air, and will soon land on the moon.



A.I.A.'s Philip Will

"It could be that aluminum producers are the victims of their own Madison Avenue people . . . "

It's amazing how inventive producers become spurred on by war generated excess capacity. Demands have been created which never existed before.

With the possible exception of glass, there is some aluminum substitute for nearly every part of a building. Frightening though this sounds to a lavender and old lace architect, this is probably the exact way the aluminum producers see their future in the building industry.

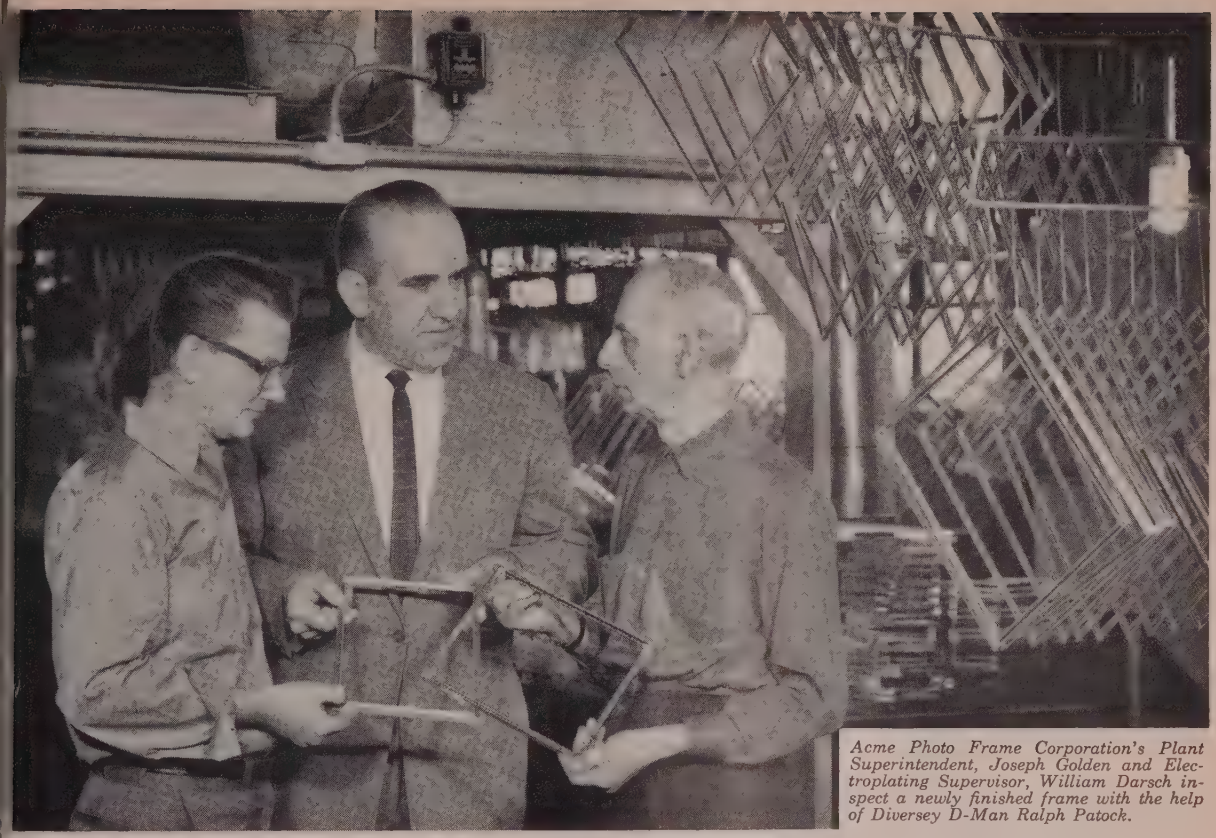
And they may be right.

May I, however, sound a tiny note of alarm. It could be that aluminum producers are the victims of their own Madison Avenue people and actually believe the beautiful prose that enthralls and the artwork that inspires.

The note of alarm is that within the building market aluminum may be close to equilibrium. The really right uses of the material become daily more evident and time is underlining the misuses. The architects, builders, subcontractors, dealers, producers, mechanics and tradesmen that compose the building industry are hard-headed pragmatists. They learn by experience and can rarely be oversold twice.

Aluminum is now accepted. The volume consumed will fluctuate largely with the growth or contraction of the building market, unless and until aluminum really comes of age.

In spite of my negative statements, I believe aluminum has a far greater future than is yet indicated. I believe



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it can and will come of age—but not until certain attitudes have been adopted and certain technical breakthroughs accomplished.

What are some of these and what is their significance?

Don't Mimic Others

First, aluminum must cease to copy the forms and design techniques of other materials. Let me illustrate.

Immediately after the war, producers saw a way of disposing of some excess capacity by entering the metal window market. How were the first designs executed? As imitations of rolled steel sections—even to the cross-sectional area. Result: Weak sash which obtained such stiffness as they possessed from the glass.

We can understand how this would happen once and for a brief pioneering period. But when such a practice continues, architects object.

Aluminum is such a workable material; shapes can be extruded that are economically impossible in steel. Why are not more sash profiles extruded with the metal placed where it will do the most good? Why not include in the die all the little bumps and grooves which permit tight glazing techniques such as vinyl weatherstripping or snap-in glazing stops?

The same should apply to structural shapes. I wince when I see aluminum structural shapes extruded in imitation of steel. Can we not design dies which will flow the metal into bulbs, reentrant angles, and tubular flanges so that no metal is wasted and the virtues of strength without weight are exploited to the limit?

Is wood so successful a sheathing material that aluminum siding must look exactly like it? Are roof shingles so successful that they must be duplicated in aluminum? Is wrought iron design translated into aluminum really beautiful? Does aluminum lack virtues of its own that we must so suffer from imitation?

Second, we need more bold, new and imaginative forms of structure for which the qualities of aluminum are clearly ideal.

Simply as metal for structural use, aluminum is perhaps eight to ten times as costly as steel in terms of resistance to loads per dollar of metal. It follows that simply to copy conventional structural patterns is patently futile. Other materials have too much of a head start.

We must therefore think in unconventional terms. In unconventional structures much progress is being made—particularly in roofing large open spaces. A geodesic dome is a happy use of aluminum. Light weight is a real economic advantage affecting the cost of the supporting structure. Evident is the multiplying benefit of a self-supporting structure where dead load is the primary design factor. Also, remember that in a free roof structure we suffer least from aluminum's relatively high elastic instability.

For low buildings, imagine new composite wall systems which will not only support themselves but floor loads as well. Conventional studs or columns plus sheathing will get nowhere. A successful aluminum wall system will require that every part do double or triple duty. Such duty will be mechanical or electrical as well as structural.

For example, an exterior skin could be stressed in tension, serve as the appearance surface and also, like the human skin, sweat a little to cool the building in summer.

Interior surfaces can have permanent vinyl coatings, incorporate radiant heating and cooling and convenience wiring, plus luminescent panels for light.

The structure would be assembled with glue, which would probably be factory applied along panel edges and temporarily protected against premature setting by removable strips of tape. The panels, incidentally, would be large because their light weight makes them easy to ship (even by helicopter) and erect.

And so it will go—unconventional and designed from scratch by people who don't know what cannot be done. Perhaps under the heading of unconventional structures, is a good place to mention unconventional building types.

We all know about mobile homes, but have we thought of the other special purposes that might well be housed in mobile structures? Some are already in use—bookmobiles, medical units, builders' field offices, real estate offices, photographic studios, laboratories and other special purpose rooms for school use.

Need Permanent Finishes

Third, we must perfect permanent uniform protective finishes in attractive colors.

I would like to persuade the aluminum industry to be realistic about the appearance of aluminum. Do not be taken in by your own publicity. In its bright state aluminum is not beautiful. It is a cold blue white, and given a choice, people prefer warmer colors.

Silver and stainless steel are warmer in color and seem (to this observer, at least) to do a better job of reflecting other juxtaposed colors. In spite of your sales statistics, people prefer gold and bronze—if only they could be had at the same price as aluminum.

Architects are aware that the industry is working hard on finishes and colors—from hard coat anodizing, through chemical application, to organics such as alkyds, acrylics, vinyls and epoxies to inorganic porcelain enamels. We even find manufacturers most enthusiastic—until we ask for a ten or even a five year replacement guarantee.

Nothing is sadder than splotchy nonuniform color, or a gold anodize that has faded to a dirty ochre, or a spalled porcelain enamel. We await the color breakthrough. The effect on sales and architecture will be enormous.

Encourage Designers

Fourth, encourage designers outside the aluminum industry to exploit the versatility of aluminum.

This may seem obvious, but sometimes the obvious is overlooked. Most consumers are overwhelmed by the industry's catalogues of stock parts such as sheets, rolled sections, extrusions, castings, etc. They do not realize how cheap the dies really are. Imagination is limited by the assumption that only stock items are available or can be afforded.

I served as a juror for the Reynolds Award — an annual international competition to select a building which is itself a well designed building and uses aluminum imaginatively and appropriately. Each year, so far, the winner has been foreign. Why? An important reason is that Europeans generally do not have pre-designed catalogue parts from which to order. They must and do create their own detailed designs.

There is a vast reservoir of talent and imagination waiting to be tapped. All that needs to be said is: "Tell us what you want and we will make it."

Fifth, the aluminum industry must work together in its own interest. As far as I can observe, trade associations in the aluminum industry are pretty nominal affairs. It is not all for one and one for all but one for one and occasionally all for all.

Too often, association standards are established for the lowest common denominator; quality limits are set for the poorest producer. Consequently, we architects ignore the brochures that reach us through the mails and must establish our own standards of quality and performance.

And while I am on this subject, may I make a special plea for the adoption of industry-wide uniform nomenclature. A proprietary name for a chemical or mechanical finish fills a manufacturer with nostalgic pride, but it fills the architect with confusion or even nausea.

Any competitive advantage is ephemeral to say the most. Meanwhile architects, builders and the public get madder by the minute and the whole industry suffers. It's your funeral but we are tired of being the pall bearers.

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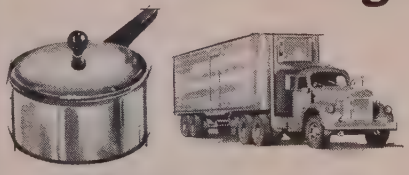
Now Fairmont creativity combines the advantages of two great metals



FROM POTS AND PANS TO REFRIGERATED TRUCK BODIES

Cooking utensils which combine the excellent heat transfer properties of aluminum with the resistance to food acids of stainless steel. Or refrigerated transport which meets stainless regulations and also makes use of aluminum's light weight for bigger payloads. Or what have you? Fairmont Stainless Clad Aluminum will revolutionize a complete field of metal fabrication. Get in on the ground floor with Fairmont!

THEY SAID IT WASN'T PRACTICAL. But an intensive research program has been concluded, and Fairmont's new Stainless Clad Aluminum is now being rolled on a production basis, via patented methods providing a perfect molecular bond.

By successfully combining the ductility, light weight and high conductivity of aluminum with the strength, corrosion resistance and lustrous beauty of the stainless steel, Fairmont has opened doors wide to a thousand and one product improvements leading to more sales and new products by fabricators of all kinds.

Initially, Fairmont Stainless Clad Aluminum is being produced in flat sheet and flat circles or blanks. Other sheet forms will be made available in the not too distant future. For fabricators who know it pays to plan ahead, NOW is the time to call in a Fairmont representative for detailed facts, figures, application ideas.

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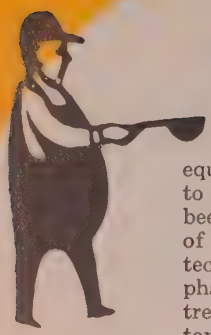
Wherever aluminum needs heat



LINDBERG FISHER

You'll find this nameplate on all the equipment you'll need for applying heat to aluminum. Heat and aluminum have been Lindberg's babies for years. Our staff of expert engineers, metallurgists and technicians is widely experienced in all phases of aluminum melting, casting, and treating and has pioneered many important developments in aluminum processing by heat. Today, Lindberg offers you a complete line of heating equipment for every requirement in this field. This includes every needed type of melting, holding or heat treating furnace, large and small, shop built or field erected, fuel fired or electric (resistance, 60 cycle induction, arc or high frequency). We hope you'll let our symbolic friend, "Little Joe", guide you through the exposition of this equipment offered on these pages.

Meet "Little Joe"! He looks something like a fellow in our plant but we really use him as a symbol of the good right hand of service Lindberg-Fisher's expert design staff and our complete line of "heat for aluminum" equipment is able to render you.

Hot Metal Delivery

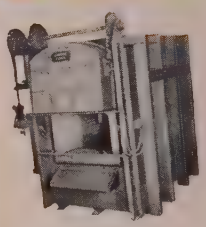
MELTING

"RIGHT FROM THE START, LINDBERG EQUIPMENT TAKES OVER YOUR ALUMINUM HEATING NEEDS."

Fuel fired reverberatory. Charging well optional.

"MOLTEN METAL FROM REDUCTION CELLS IS HELD, OR INGOTS MELTED, IN FURNACES LIKE THESE"

CASTING STATION

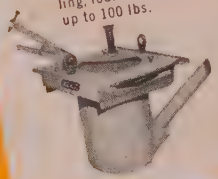


Fuel fired reverberatory, holding or melting.

"MOLTEN METAL IS HELD AT THE CORRECT TEMPERATURE UNTIL PROCESSED INTO CASTINGS."

"MANY CASTING STATION FURNACES CAN BE EQUIPPED WITH THE LINDBERG AUTOLADLE, NAMED 'LITTLE JOE', AFTER ME."

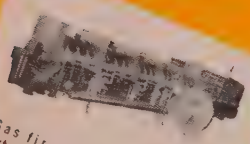
Autoladle for automatic ladling, four shot sizes available, up to 100 lbs.



HYNI nitrogen generator, for atmosphere melting and fluxing.

Fuel fired crucible or pot, holding or melting, stationary. **New radiant wall type also available.**

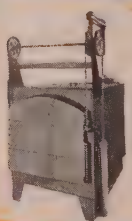
SPECIAL EQUIPMENT



Gas fired billet heater for extrusions.

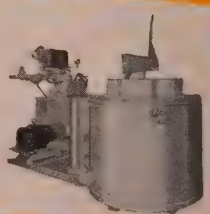
"SOME CASTINGS MAY REQUIRE HEAT TREATMENT AND THESE ARE HANDLED IN THE FURNACES BELOW."

"SO, DOWN TO THE FINISHED PRODUCT, LINDBERG EQUIPMENT TAKES CARE OF EVERY STEP."

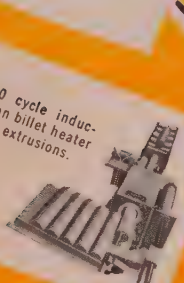


HEAT

Cyclone heat treating, electric or fuel fired, box or pit.



Cyclone heat treating, electric or fuel fired, box or pit.



60 cycle induction billet heater for extrusions.

BILLETS RODS

CASTINGS

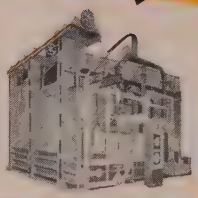
LINDBERG equipment will apply it

Key
Molten Metal
Solid Metal

AND HOLDING FURNACES

Ingot

60 cycle two chamber induction, tilting.



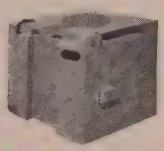
Fuel fired double reverberatory. Especially suitable for alloying. Charging well optional.

60 cycle, two chamber induction, tilting; melting and holding.

"AS REQUIRED, MOLTEN METAL IS TRANSFERRED TO FURNACES AT THE CASTING STATIONS."

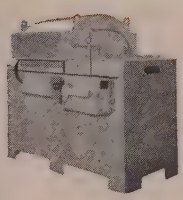
"INGOTS CAN ALSO BE MELTED AND HELD IN THESE FURNACES."

MELTING, HOLDING AND REMELT FURNACES

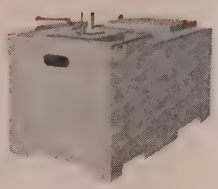


60 cycle induction coreless, tilting, ideal for melting chips.

FURNACES

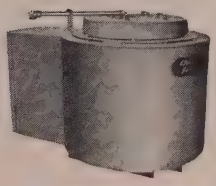


Electric resistance, "radiant dome," reverberatory, holding.



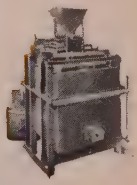
60 cycle, two chamber induction, holding or melting, stationary.

Fuel fired, crucible or pot, tilting, melting.



Electric resistance, crucible or pot, holding or melting, stationary.

Fuel fired, Dry-Hearth, two chamber, holding or melting.



Electric resistance, "radiant muffle," Dry-Hearth, melting and holding, nitrogen atmosphere.

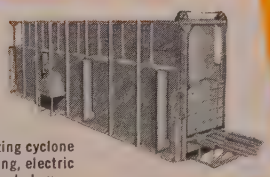
High frequency induction, tilting, melting.

"GATES, RISERS, SCRAP CASTINGS, ETC. GO BACK TO THE FURNACES AT THE RIGHT FOR REMELTING."

Fuel fired, Simplex, rotary, horizontal drum, melting.

"WHY NOT GET IN TOUCH WITH LINDBERG FOR YOUR ALUMINUM HEATING NEEDS? TELL THEM 'LITTLE JOE' SENT YOU."

TREATING FURNACES



Homogenizing cyclone heat treating, electric or fuel fired, box.

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Siding Makers Dispute FTC Rules

Association attacks code dealing with unethical selling; urges policing of competitive practices within industry.

GROUND rules for the aluminum siding industry moved another step toward completion late in March when the Federal Trade Commission conducted its second hearing on the subject, in Chicago's Palmer House.

Only 50 persons attended — there were 100 at the first meeting last September — but there was a sharp contrast between the two gatherings. The first seemed to attract docile businessmen who were either unprepared or unwilling to comment on the proceedings.

Standards Not Needed?

The second hearing was lively and argumentative. There were even amusing moments — especially when one participant suggested that standards may not be needed; that the siding industry is maturing and cleaning its own house. Some heads nodded vigorously in agreement — but there were embarrassed smiles on the faces of some siding men who knew better.

This whole standard business was begun by the FTC late in 1959 when it asked the Aluminum Siding Association to examine the advisability of conducting a Trade Practices Conference for the residential siding industry. The ASA, though slow to start, finally created a committee to meet with FTC representatives, and ultimately prepared a guide consisting of 15 proposals. Then the FTC took over.

First, an open meeting was called (it was held Sept. 9, in Chicago) so that the ASA proposals could be discussed and augmented. There followed a 3-week period during which additional comments, proposals or recommendations could be made to the FTC.

Then all proposals were printed, and booklets were mailed to hundreds of siding manufacturers, distributors, etc., for their examination. This booklet was discussed at the March 22 meeting.

Minor disputes erupted during the first half of the hearing. The major argument centered about the type of proposals made by the FTC. Gripes were directed at Barnett Watson, FTC's attorney in charge of the hearings. The FTC rules, designed to supplement the proposals of the ASA, cover the following:

Deceptive use of model home representations; false "gift" offers; bait advertising; misrepresenting character of business; misuse of term "custom-made," etc.; use of word "free"; deceptive invoicing; exclusive deals; prohibited forms of trade restraints; prohibited discrimination.

The FTC, in other words, wants to establish certain rules of conduct for siding firms to follow when dealing with consumers.

The proposals offered by the ASA had a different theme — to set up regulations governing relations between siding firms; to keep competition clean.

A combination of FTC and ASA proposals would seem to be the most desirable approach. Fair dealing with the consumer would raise the industry's status while securing the position of individual members. Clean competition would foster a healthy industry.

But the ASA is not backing the FTC proposals. In fact, A. Alvis Layne, ASA attorney, stated that his organization takes exception to 10 of the FTC proposals and to one paragraph of another.

The 'Model Home' Gimmick

Let's examine three of the rules the ASA takes exception to. After Rule 2 was read (concerning deceptive use of model home representations), one member of the assemblage asserted that "the model home has not been misused to any great extent in the past five years."

Later on, we checked this out with M. John Madsen, vice president of the Chicago Better Business Bureau. Though statistics are not kept which tally complaints specifically related to aluminum siding jobs, complaints against home improvement companies are numerous enough to place this industry close to the top of the list, according to Madsen. This applies to the nation as a whole, as well as Chicago.

But Madsen says the character of complaint is the same now as it was five and ten years ago. Homeowners are being "burned" in the business transaction, but almost never complain of product performance. And the most common complaint concerns misrepresentation of model home deals.

The ASA also objected to a portion of Rule 11 (concerning deception as to agency status and authority), which states that it is unfair for any siding dealer to say he is an agent of, or otherwise affiliated with, a manufacturer or distributor of siding when, in fact, he isn't.

Madsen says this is an area which also needs policing. He cited a recent case in which advertisements and letterheads of a midwest siding company claimed that the firm supplies Alcoa Reynolds and Kaiser residential aluminum siding. Of the three, only Alcoa actually manufactures residential siding.

The need for inhibiting bait advertising (Rule 6) is also apparent to Madsen, who described the latest fad. Recently, two Chicago firms ran newspaper advertisements offering 1000 square feet of aluminum siding, enough to sheath a five-room house, for $300. The gimmick is that the price quoted is for unpainted siding. The cost of painting adds substantially to the cost of the entire job — four or five times as much.

In objecting to these and other FTC proposals, the Aluminum Siding Association seems to assert that relations between the industry and the consuming public are not so serious as to require external enforcement of fair trade practices. Or perhaps the Association feels that policing of a code of ethics between manufacturers would ultimately lead to an improvement of the industry's "image."

Won't Hurt the Good Guys

Certainly, the ASA is to be commended for cooperating with the FTC in setting up trade practice rules. But the experience of other segments of the home improvement products industry suggests that the type of code suggested by FTC would hurt, not the reputable majority of siding firms, but only the fly-by-night sharpies who are smearing the reputation of the industry as a whole.

The campaign for better trade practices is far from over. More comments and recommendations will be examined at another hearing held. Eventually, a manual outlining proper business conduct for aluminum siding firms will be published — and enforced in accordance with existing law.

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MIG WELDING—applications; equipment; filler alloy; adjusting arc; torch manipulation; trouble shooting.

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RESISTANCE WELDING—types of machines, electrodes, cleaning methods, etc. for spot, seam, flash welding.

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(See article, page 32, this issue.)

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Olin Research Moves One Step Closer To Aluminum From Clay

Improved process for crystallizing aluminum sulfate announced last month at dedication of Olin Research Center at New Haven, Conn.

THE long-sought method of economically obtaining aluminum from common clay is one important step closer to realization, according to an announcement by Olin Mathieson Chemical Corp.

Olin research scientists have come up with a crystallization process that produces large, easily handled crystals of aluminum sulfate from leached solutions of clay or shale. Previous methods have yielded extremely small crystals that are difficult and costly to separate from iron contaminants.

With their crystallization process proven out on a pilot plant scale, Olin researchers are now working on a thermal method for decomposing the aluminum sulfate to alumina, which would then be converted into metallic aluminum by the conventional electrolytic process.

"With this key step, it should be possible to produce aluminum where cheap power exists, without having to compromise on plant location to suit both the raw material and the power source," declared Dr. W. E. Hanford, Olin's vice president for research.

Most alumina plants have been located on deep water ports to reduce the cost of shipping ore from the tropical "bauxite belt." The Olin acid process may open the possibility of placing a complete aluminum plant on one site where coal for electric power is cheap, since the shales associated with most coal could be an excellent source of alumina.

The Secret: Big Crystals

Many processes have been proposed for extracting aluminum sulfate from alumina-bearing clays and shales. What makes Olin's method attractive economically, according to Dr. Hanford, is the large size and purity of the crystals recovered — ⅛-inch to 1/16-inch diameter, compared to less than 1/100-inch for earlier processes.

The acid process for extracting alumina from clay or coal mine shale consists of three steps: (1) leaching low alumina-content clay or shale with sulfuric acid to put the aluminum (and, necessarily, some iron) in solution; (2) separating iron and aluminum sulfate by crystallization; (3) processing the resulting aluminum sulfate crystals into alumina and recovering the sulfuric acid for recycling.

Step one produces an acid solution of iron and aluminum sulfate. This solution must be separated to produce aluminum sulfate containing less than 0.03% of iron relative to aluminum.

It was known that by evaporation of water, a saturated solution could be obtained from which aluminum sulfate would crystallize. The crystals, however, were always small and mushy and carried large quantities of entrained iron. It was difficult to filter this slurry.

High Recovery Rate

A detailed, fundamental study of the nature of crystallization revealed a means of crystallizing the aluminum sulfate in large crystals that were easily separated from the mother liquor. Since the process is controlled, high purity aluminum sulfate is obtained and the percent recovery of the aluminum is excellent, according to Dr. Hanford.

Olin has several patents on this crystallization concept and has other more general patents pending. The trick was to transform the concept into a practical process, Dr. Hanford pointed out. This was developed and perfected by Walter C. Saeman, senior research associate in Olin's Metallurgical Laboratories.

The next step is to find a thermal method for decomposing aluminum sulfate to alumina and for economically recovering the sulfur trioxide. The latter would be recycled to the leaching step to extract more aluminum sulfate. Several schemes for thermal decomposition have been evaluated in the Olin laboratory and plans are underway to pilot the next step.

"Preliminary laboratory work on this next step has been very encouraging," Dr. Hanford said. "Production costs of the process have been estimated and they are competitive."

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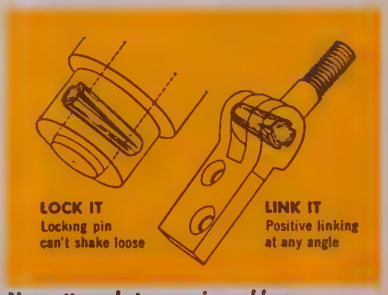

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SEE OUR CATALOG IN SWEET'S

Greater Integration for Broader Product Lines

American Screen Products installs cold rolling mill and roll-coating line; develops new line of aluminum products for big "home and yard market" of tomorrow.

by H. K. Darby, Associate Editor

With its usual foresight and attention to detail, American Screen Products Co., Chatsworth, Ill., is well launched in its bid for supremacy in a market that might not take completely recognizable shape for another five or ten years. This statement will seem contradictory only to those who do not know the company. The accuracy of management's appraisal of the future has seemed almost clairvoyant, and doubtless explains the firm's solid growth over the years.

As of now, American Screen Products has adjusted to a sizeable effort in backward integration and is already launched on a program to broaden its product range. For years it has been the leading manufacturer of aluminum residential window screens (MM, March, 1958) and there is no reason to believe that it will not make the same conscientious effort to excel in other product fields.

"We are definitely broadening our scope," says John D. Foskett, president of American Screen Products. "We're shooting for a market that is unique in that most of its products aren't even off the drawing board yet."

'Home and Yard Market'

Foskett refers to what his company chooses to call the "Home and Yard Market," and they have made known their new range of interest by adopting a new slogan: "Homeshield Products for Home and Yard."

The diminishing importance of the auto—caused, perhaps, by the increasing restraints being imposed upon it each year, will cause householders to look increasingly to their homes as places for recreation and relaxation, Foskett believes.

"As time goes on, people are going to have to live closer together, under conditions which will almost be repugnant," he said. "There will be a real need for products that will make staying at home more enjoyable under these crowded conditions and, of course, with greater privacy."

Constantly appreciating land values with a consequently increasing desire on the part of the homeowner to improve his home are related factors tending to generate this new demand.

The home and yard market is relatively new, Foskett said, pointing to the patio as an example of fast development of new products.

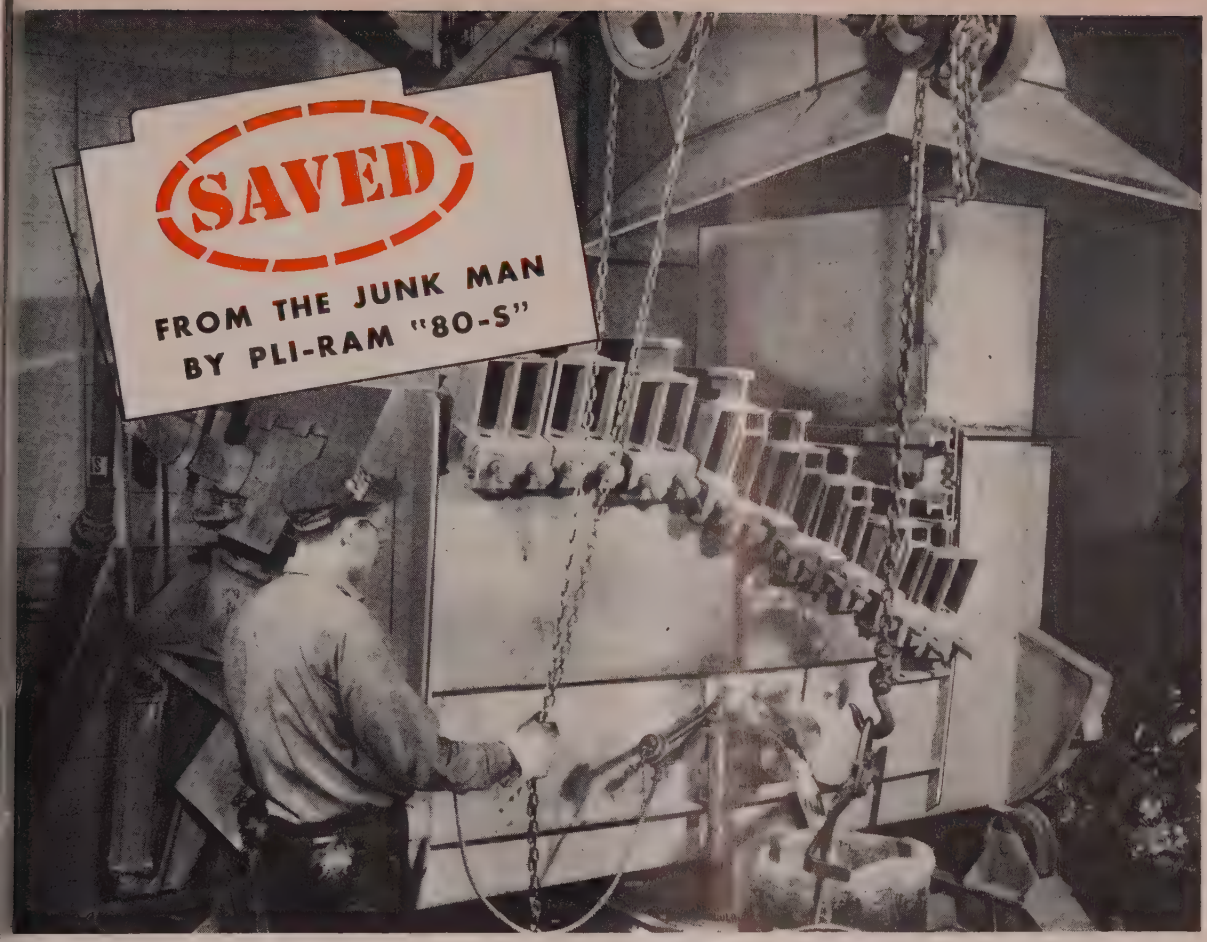
"A couple of years ago it was hard to thought of as a recreation area, or a second dining area," he said. "Today it's an important consideration in home planning.

"The simple desire to hide an unsightly backyard fuel tank can create products; there will be a greater need for recreational products for children and products born of a need for more privacy."

In view of all this, it is understandable that American Screen Products has a major new products development effort under way. The company has set up a full-fledged department staffed by four people; the manager reports directly to Foskett who said they are beginning to see real results.

The new department's first achievement was development of the Homeshield Privacy Panel. This is a series of individual sections which are formed from .025-inch thick, 8½-inch wide aluminum. Both sides of the metal are painted white for identical appearance from either side. Eight of these panel sections or pans, are packaged together with the necessary crossbars and hard-

Privacy panels were the first new product engineered by American Screen's new product development department, organized by the company last year. The redwood posts offer a pleasing contrast with the painted aluminum.



CUTTING UPKEEP 42% GIVES FURNACE NEW LIFE

Advance Tool & Die Casting Co. of Milwaukee proves quality lining less costly, less troublesome

"Before installing Pli-Ram '80-S', we were ready to junk our aluminum melting furnace," *reports the Plant Superintendent.* "We repeatedly tried other types of linings. None lasted more than a year."

"Besides the re-linings, frequent in-between maintenance was a headache. And contamination reduced aluminum fluidity, clogging our die casting machines. Before scrapping the furnace, we decided to see if a quality lining would pay."

"We installed Pli-Ram '80-S' in the sidewalls, the door, and the furnace bottom. That was 2½ years ago, and the lining's still in place. We've had no maintenance, no metal contamination. Our cost per month of service is down 42%."

PLI-RAM "80-S", used in the Stroman tilting furnace pictured, is a high alumina ramming mix that forms a dense, stable monolithic lining. It's non-wetting, with excellent resistance to aluminum penetration and aluminum oxide build-up. It's one of a complete line of Plibrico refractory products formulated to serve the furnaces of industry effectively and economically.

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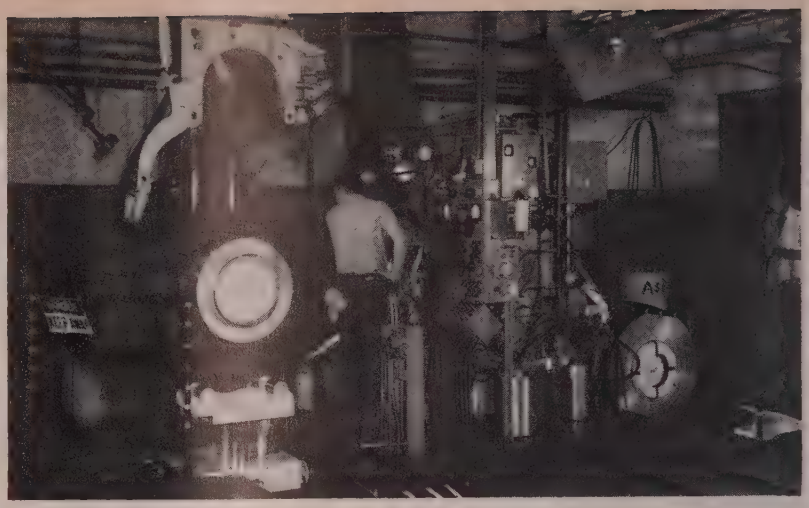

■ *American Screen Products Co. is now buying hot rolled aluminum sheet .225-inch thick, and cast aluminum sheet of the same thickness and re-rolling it to required thicknesses between .051 and .025-inch for screen frames and splines, patio screen frames, doors and privacy panels. The Hunter mill has many new features.*

ware and make one panel six feet long. This product is made in heights of 4, 5 and 6 feet. The posts are redwood.

"Everything is packaged except the posts," Foskett said. "These are sold by the lumber dealer. We are considering aluminum tubular posts, but we are held to the redwood as much by its pleasing contrast with the painted aluminum as by the fact that they serve as a tie-in with the lumber dealer."

As of now the new product is produced only in white in order to keep dealer inventory problems simple at the outset. As soon as they discover what other colors meet the needs of the home owner, the necessary steps will be taken.

The 4-ft. panels retail at $24.95; 5-ft., $29.95, and 6-ft., $34.95.

Foskett calls the panel a "real take-home, do-it-yourself package." The individual sections or pans, and the cross braces are pre-drilled for self-tapping screws. Foskett claims that the Homeshield panel is the only packaged product of its type. It is thoughtfully packaged, too. Nine inches wide and 2 inches thick, the panel package is the same length regardless of panel height, to simplify the dealer's storage problems.

Smart Packaging

The packages are carefully identified on sides and end for both storage methods. Furthermore, they are illustrated on the outside with line drawings in blue, showing the various ways the panel can be used. Simple assembly directions are also printed on the package. The panel can almost be sold without its ever being taken from the package. The homeowner buys as many panels as he thinks he needs for his purposes.

"People improvise in all kinds of ways to gain privacy or to hide unsightly objects around the yard," Foskett said. "While the panel will satisfy many needs, we're not selling it as a fence."

American Screen has given a new quality to the aluminum combination door. To Foskett's way of thinking, its sameness has always been its worst fault.

"They're all in mill finish aluminum and they all stand out like sore thumbs," is Foskett's judgment. The Homeshield Grill Door, painted white, with a panel of small mesh expanded aluminum covering the insect screening on the outside, has much greater distinction.

Not that the company has eschewed production of plain screen doors, however, these are given a baked enameled finish. They're made in four sizes; the door frame is 11/16 x 2⅛-inch, .040-inch aluminum, with a z-bar pre-hung frame and adjustable expander bottom channel. They have a 6½-inch high kickplate and a 2½-inch push bar. The screen cloth is called Vision-Ease because it is prepainted in dark gun metal finish for better vision through the mesh.

The Grill Doors come in two widths and two heights. Like the plainer product, the Grill Door is pre-hung in a z-bar frame and has the Vision-Ease screen cloth.

The expanded aluminum panel over the screening changes a vulnerable combination door into a security door and justifies the use of a lock. It also increases privacy because the householder can see out, but the outsider cannot see into the home too well.

Another successful new product of American Screen's is the Homeshield patio screen panel. Packaged in widths of 3½, 4, 5, and 6 feet, this handy panel

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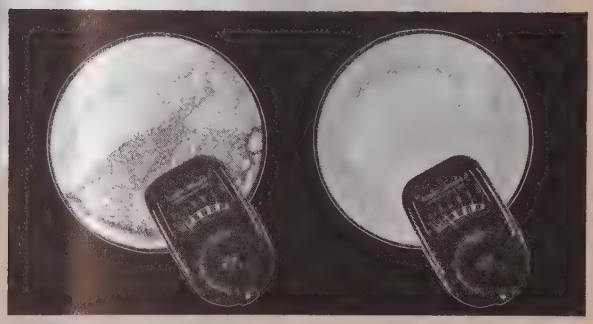

Simple test and light meters indicate that the Aluminum Stain Test Plate on the right, coated with KS-485, has no stain and is twice as bright as the disc on the left, which was coated with a commonly used product.

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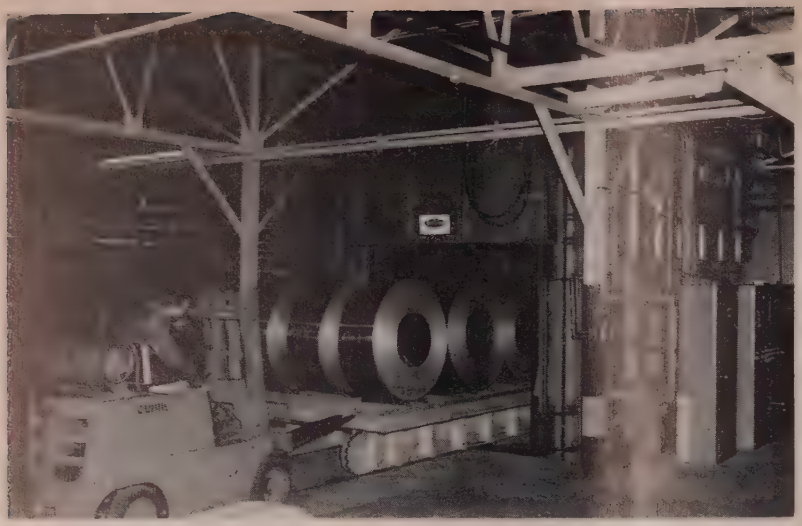


■ *This 30,000-pound capacity annealing furnace is capable of heating a full load of aluminum coils from room temperature to 900° F. in six hours. Maximum operating temperature is 1200° F. The unit, installed by Sunbeam Equipment Corp., gives close control of elongation, an important consideration in efficient roll forming.*

has a standard height of 7 ft. 6-inches. The range of available widths permits their use in 1-foot increments. The panel is a floor-to-ceiling design, but the bottom portion is a solid aluminum panel to increase privacy, present a tougher bulwark to children and dogs, and generally enhance appearance. American Screen Products views the patio panel as a standard building component.

"It is strong because we use .051 inch aluminum," Foskett said. "We roll form it in a heavy-duty machine, package it pre-drilled. The do-it-yourself householder can use them to good advantage wherever he has an existing structure such as breezeway, porch, port cochere or covered patio."

American Screen Products has been an integrated manufacturer of screens for many years. Today, it is integrated in terms of its basic raw material. Whereas it once had to buy aluminum coil in its finished gauge, today it buys hot rolled coil .225-inch thick and reduces it to various required gauges in its own cold rolling mill. This mill, built by Hunter Engineering Co., Riverside, Calif., is a 2-high, 18-inch wide unit.

"The work rolls are 15 inches in diameter," said James Postlewaite, superintendent of operations. "This gives us a real stiff mill."

The mill offers a choice of 200 or 450 fpm constant rolling speed and, at .225-inch beginning coil thickness, allows up to a 60% breakdown in one pass. They can produce .025-inch thick coil from .225-inch in three passes.

American Screen uses 5005 alloy and building sheet produced by the leading primary producers.

"The ideal rerolling method is to break down on one mill and finish on another," Postlewaite said. "However, that arrangement for us is still in the future."

Proper strip lubrication, plus a bright, stain-free surface, is assured by the use of Kleen Strip 485-H, a patented rolling oil formulated by Kerns United Corp., Chicago, producer of specialized industrial lubricants. As a protection against contaminants or "tramp oils," Kerns' ML-6900 hydraulic fluid is used in the cold mill's hydraulic system because of its compatibility with the rolling oil.

Continuous Filtering

At American Screen, the lubricant is poured into a 2000-gallon reservoir and pumped to the cold mill at a rate of 210 gpm. This is part of a continuous automatic filtering system for the rolling oil installed by Gale Separator Div'n of Infilco Inc., Tucson, Ariz.

After the oil has been used it gravity-feeds to a dirty oil tank from which it is pumped through a filter of diatamaceous earth. The clean oil then flows to a clean oil sump. Before the clean oil re-enters the system it is pumped through a heat exchanger which keeps the oil below a maximum temperature of 85°F and above 70°F.

"While the maximum possible output at the mill is 210 gpm, the system *filters* the rolling oil at 200 gpm," Postlewaite said.

Added features of the Hunter mill are powered dollies that move coils to the powered pay-off reels, then elevate them for easy and quick mounting; a series of bridle rolls through which the sheet is passed to give it a flat entry into the work rolls; and hydraulic bottom-up clamping pressure exerted upward against the bottom roll.

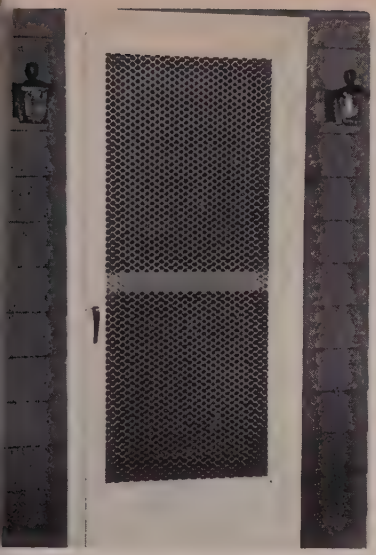
"This is the first Hunter mill to have this feature," Postlewaite said. "It's Hunter's idea that we get better gauge control and faster braking."

American Screen's decision to work from re-roll stock meant that an annealing furnace would also be necessary. When running the .225-inch re-roll stock an intermediate anneal is needed after the second pass so that proper hardness will be achieved in the third pass. Availability of such a furnace would also give American Screen closer control of metal hardness generally.

Sunbeam Equipment Corp., Meadville, Pa., installed a two-zone car type furnace, single door, with a rating of 30,000 pounds of aluminum coil per load. Twelve coils are normally processed in any one load. Each has a 48-inch outside diameter, 17-inch width and 20-inch inside diameter.

The furnace is capable of heating a full load from 70°F to 900°F in six hours. Maximum operating temperature is 1200°F. Temperature tolerances of

■ *Patio screens are made in a variety of widths and one standard height; they offer the do-it-yourself home-owner a desirable new home improvement item, and can be used effectively by the new home builder.*



The aluminum screen door is given a ecided lift, appearance-wise, by the ad- tion of the expanded aluminum panel; also becomes a security door, justifying se of a lock. The baked enameled door a new product of American Screen roducts Co.

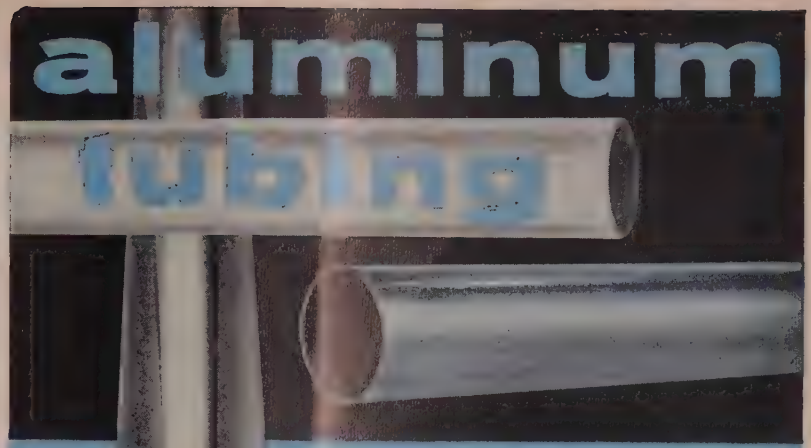
lus or minus 10°F are maintained in he 500°F to 1200°F range.

Outside dimensions of the Sunbeam stallation are approximately 18 feet ide, 21 feet high and 21 feet long. nside dimensions for loading the work re 7 feet wide, 16 feet long and 5 feet igh. It is operated on natural gas.

One of the most important design nprovements on this furnace is the ecial continuous roller tread chain at replaces the conventional type of heel on the bottom of the furnace car. his type of traction system requires ttle maintenance, no lubrication and ves excellent weight distribution on e traction system. Besides, it elim- ates the necessity of using a hinged il section to bridge the trough into hich the charge door moves in sealing e furnace.

Each of two centrifugal fans are quipped with a 60 h.p. motor to sup- y a high rate of air recirculation. hey are located on top of the furnace r easy inspection and servicing. In- de, baffles separate the work from the diant tubes. Both the baffles and fan esign contribute to the positive recir- lation of the air and elimination of y direct radiation on the aluminum.

Furnace operation is simple. After the uminum coils have been moved into e furnace, the operator sets the two eeds & Northrup zone instruments to 0°F above the desired anneal tem- erature. From this point on, the oper- ation becomes completely automatic. When the hottest thermocouple in e load reaches the desired annealing mperature, a light will come on in-



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■ *American Screen's new painting line includes this roll coater which is the first to have certain desirable new features. Gasway Corp. built this unit, and other elements of the painting line.*

dicating that the instruments are being reset to the proper soak temperature. A soak timer is automatically started when the coldness thermocouple has been maintained for two hours, the timer rings a bell and a light indicates the cooling period must be initiated. It takes eight hours to full anneal the aluminum coil.

The furnace door is moved up and down by an Electrolift door mechanism; a water cooled aluminum extruded door assembly with a neoprene gasket assures a positive seal at all times. The entire inner liner is stainless steel paneled; in addition to absorbing internal expansion, this type of lining eliminates "dusting" of the insulation when exposed to high velocity recirculation It is tied into the outer furnace shell, backed up by eight inches of insulation.

"At the very least, we like to have 7% elongation in our strip to enable it to take the severe bends given it in roll forming," Foskett said. "This furnace enables us to control the physicals very precisely."

American Screen's latest integration move was installation of its own coating line. The new addition housing this equipment is 21 feet wide, allowing just enough extra room to accommodate a second line when the need arises.

When observed last February, the new line was processing 2200-pound coils, putting a green vinyl coating on one side, a clear alkyd coat on the other. The coil was cast aluminum sheet which had been cold rolled by ASP to .028-inch thickness, and was being unwound from an F. J. Littell decoiler. This is a powered, twin-head device on which one head is always in line. While this head is feeding strip the other can be loaded, ready to be swung into position. This design is a desirable space saver. The twin brake mechanism is such that only the brake in feed position operates.

This coil was passing through the system at 70 feet a minute, but when white paint is being applied, processing speed is cut to 50 fpm because a heavier coat is required. Also, the white is used on the doors and patio sections which call for heavier metal and so requires longer baking time.

The line was built and installed by Gasway Corp., Chicago. Their accumulator is used to maintain the usual reserve length of strip and pay it out while coil ends are being spliced. At 70 feet a minute, the crew has little more than a minute to join the tail end of the old coil to the beginning new coil, using an Acme Steel stitcher.

Pre-Treatment First

The metal leaves the accumulator and heads for the first stage of the pretreatment, or conversion coating, line which is an alkaline degreaser kept at a temperature between 175° and 185°F. The second tank is hot rinse water, designed to keep the alkaline degreaser of the first tank out of the third tank which is the actual conversion coating, Bonderite 721A, product of Parker Rust Proof Co., Detroit. A Parker reactifier is connected to this bath which controls the build-up of impurities and is capable of maintaining the solution for three years or more. The last two stages of the system are water rinses.

The strip passes through a cooling tower before it goes to the new Gasway roll coater. According to Postlewaite, this unit has several new features contributing to an improved product.

The Gasway roll coater has a three-roll head for top side coating and a two roll head for coating the bottom side of a coil. A Gasway engineer said, "The three-roll head is necessary when applying a heavy material (the white paint previously mentioned, for instance), but running as they are now, they've removed the third roll.

All rolls in the coating head are mounted on centers—for ease of removing and ease of grinding. The rolls are also ground from centers, run on the coater on the same centers.

All rolls on the coating head are driven by triple V-belt drive, from variable speed drives mounted on the floor to eliminate vibration to the coater. The strip tension unit is removed from the coater frame for the same reason and is located before the coater as a separate unit.

An adjustable hydraulic strip tracking unit is located just before the coater to accurately track the strip into the coater.

"The strip drive is all hydraulic, which gives flexibility in both strip speed and strip tension, plus extreme smoothness," the Gasway man said.

Coincident with the debut of the new strip coating line was adoption of the paint products of Bradley & Vrooman Co., Chicago. They are American Screen's sole supplier of finish coatings.

This venerable firm has been in the industry for 81 years and is well known to the aluminum and steel strip coating industry. They've been supplying the Chatsworth firm with white, coppertone and green vinyls ever since the paint paint line started up.

"The green vinyl has excellent adhesive qualities and bakes on hard to give an appearance strongly suggesting an anodized coating," said Fred Klug, vice president of B&V. "In spite of this hard surface, the paint withstands sharp roll forming bends."

Klug said that this metallic green paint has withstood the standard salt spray cabinet test for more than 5000 hours without appreciable creeping or blistering.

American Screen bakes the enameled coil in a 60-foot, 6-zone oven. While the temperature applied depends on the color being run, Postlewaite said that the top temperature runs up to 600°F generally. Temperature of the first zone is around 350° to 355°.

"The burner, located at the far end, is a 3-jet unit," the plant manager said. "One is 'wild,' and the other two kick in whenever a thermostat directs."

Final stages of the process are a cold water rinse and drying before recoiling.

'61 Will Be Better

Equipment of the types described above adds immeasurably to American Screen Products Co.'s new product capabilities, according to Foskett, who said that despite a set-back in overall volume last year owing to generally poor business conditions, they look forward to sound yearly improvements.

"The key to success will lie in our ability to distribute effectively, provide maximum product value and availability, and maximum profit for our distributors and ourselves," Foskett said. "The Home and Yard market is a new one; it remains to be seen which retailing outlet can best serve it.

"Will it be the traditional suppliers like the lumber yards and the building materials dealers? Or will it be the home modernization or home improvement specialty houses? Whoever it is, we must recognize its full potential and make every effort to serve it properly."

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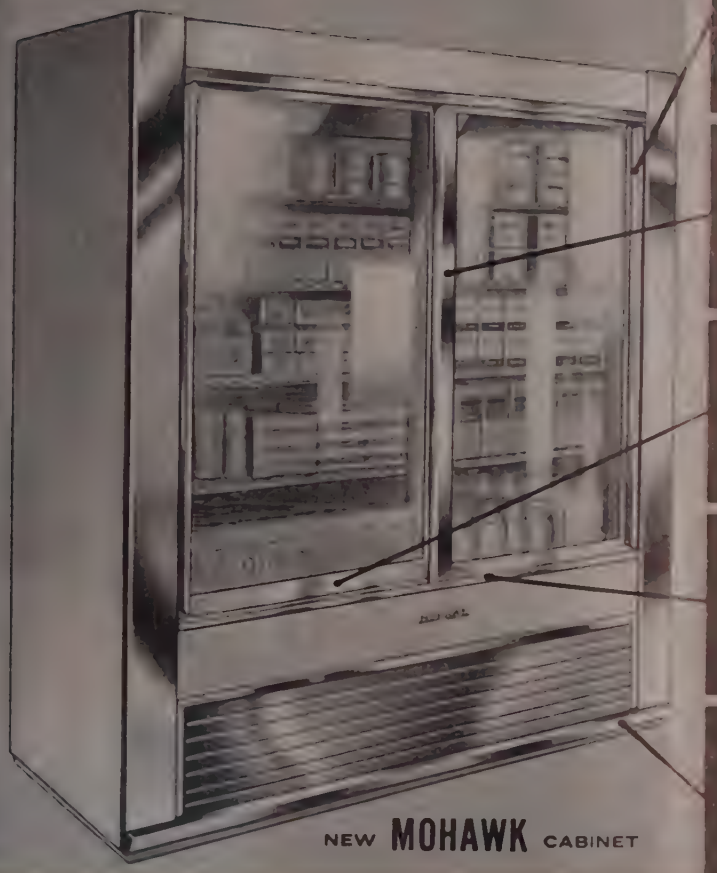
ask Superior about its money-saving aluminum extrusions

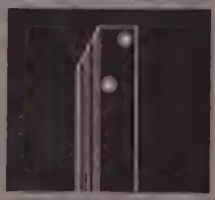


CABINET DOOR HANDLE

Extrusion includes rubber bumper adapter; mitered ends; drilled, countersunk, drilled and thread-tapped holes.

DOOR SLIDE RAIL

45 mitered, drilled, countersunk, polished, chemically brightened and anodized.

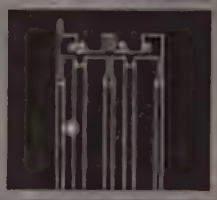


BOTTOM DOOR RAIL

(This section holds a nylon roller wheel.) Mitered, drilled, countersunk and precision thread tapped.

BOTTOM TRACK RAIL

Mitered, milled contours, drilled, countersunk, polished and anodized.



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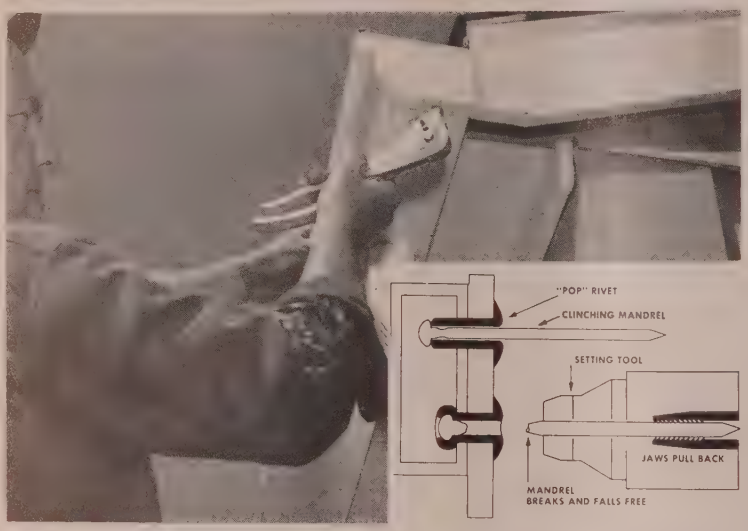
Next month: Locknuts, studs, washers, inserts, pins, retaining rings.

by F. L. Church, Senior Editor



CASE HISTORY: Pop Rivets Fasten Aluminum Gutters

A special hand tool is being used (above) to drive a "Pop" Rivet and fasten an end cap to the aluminum gutter of a National Homes unit. The rivet, made by United Shoe Machinery Corp., Shelton, Conn., is the same color as the gutter. Pop Rivets can be ordered in special colors to match aluminum siding, etc. The Pop Rivet is a blind rivet (the drawing shows how it works) that can be inserted and set from the same side of the work. Access to the reverse side is not needed. The rivet is placed in the tool and inserted into the hole. The setting tool's retracting jaws then pull the mandrel head into the rivet on the hidden side, the mandrel finally breaking off under tension.

Specification Data for Aluminum "Pop" Rivets

Rivet Diam. (inches) Ultimate Strength (lbs)	Hole Size (in. ± .002) Drill No.	Grip Ranges (inches)
3/32 (100)	.098 (#41)	.020-.070
1/8 (220)	.130 (#30)	.020-.070 .071-.120 .121-.170 .171-.230 .230-.280
5/32 (310)	.163 (#20)	.020-.050 .051-.100 .101-.160 .161-.230 .231-.310 .311-.316
3/16 (370)	.193 (#11)	.125-.250 .251-.375 .376-.500 .501-.625
.200 (450)	.206 (#6)	.020-.100 .101-.140 .141-.200
(400)		.201-.230 .231-.320 .321-.400 .401-.480

SPECIAL is an inadequate term for the multitude of non-standard fasteners available to the design engineer. Many of these devices are used more widely and in greater quantities than some standard fasteners. Others are so exotic in either design or function that they scarcely qualify as fasteners. The term "special" is too definitive in some cases; too general in others.

Nor does it necessarily imply high cost. Some special fasteners are priced on a par with the standard items they may replace. And even if they do cost, say, 10 to 20% more, this higher first cost is usually more than offset by appreciable savings in application cost.

In fact, this is the principal reason for using special fasteners. The cost of a fastener itself rarely exceeds 20% of total assembly costs. Labor cost is generally the biggest item on the ledger—and most special fasteners are labor-saving devices.

In some instances, however, special fasteners are used simply because no standard item will do the job. Cost competition, if any, is most likely to occur between different specials. In such cases, price of the fastener may loom larger in the total cost picture.

In any event, there's always a good possibility that a special fastener will reduce assembly cost or improve the product or both. (For examples, see the case histories on these pages.)

The changeover from standard fasteners to specials on an existing product may be impractical. But if you're developing a new product, or redesigning an old one, it's well to consider specials as well as the standard fasteners dealt with in earlier installments of this report (see MM, Jan., Feb., March, '61).

The purpose of this fourth section of the report is to describe some special fasteners that are applicable to aluminum products. Considering the vast scope of the special fasteners industry, our discussion is necessarily limited with respect to types of fasteners covered. We will deal with special rivets,

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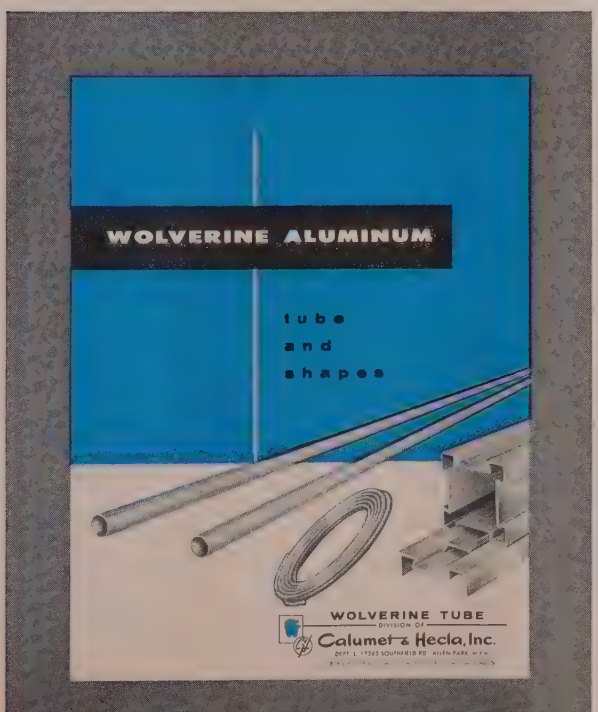
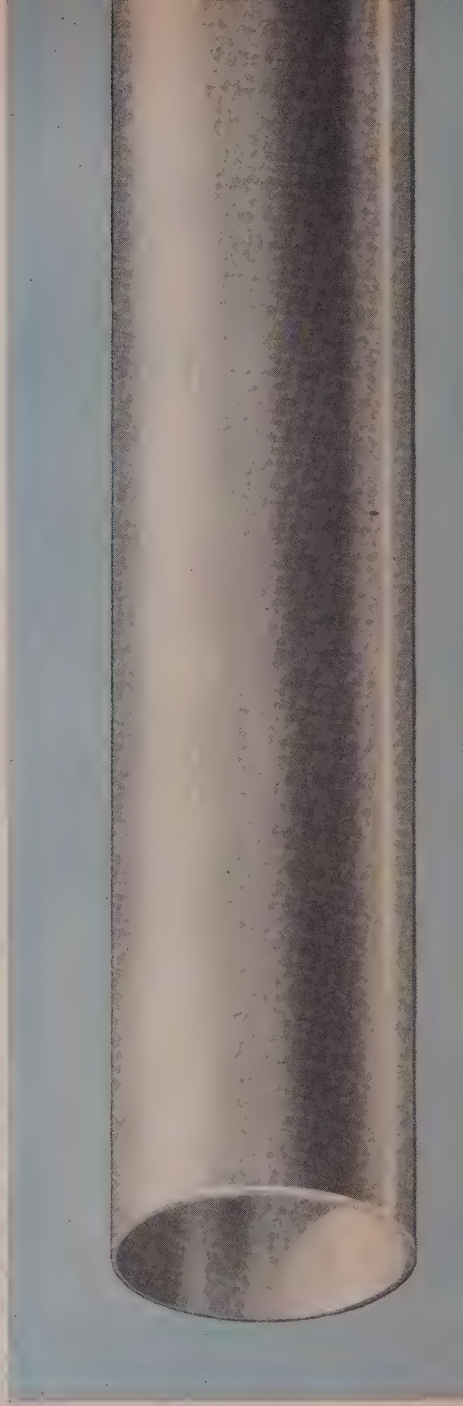
For complete information about Wolverine products and services just ask your Wolverine salesman—HE KNOWS. Write, too, for a copy of the Wolverine Aluminum Catalog.





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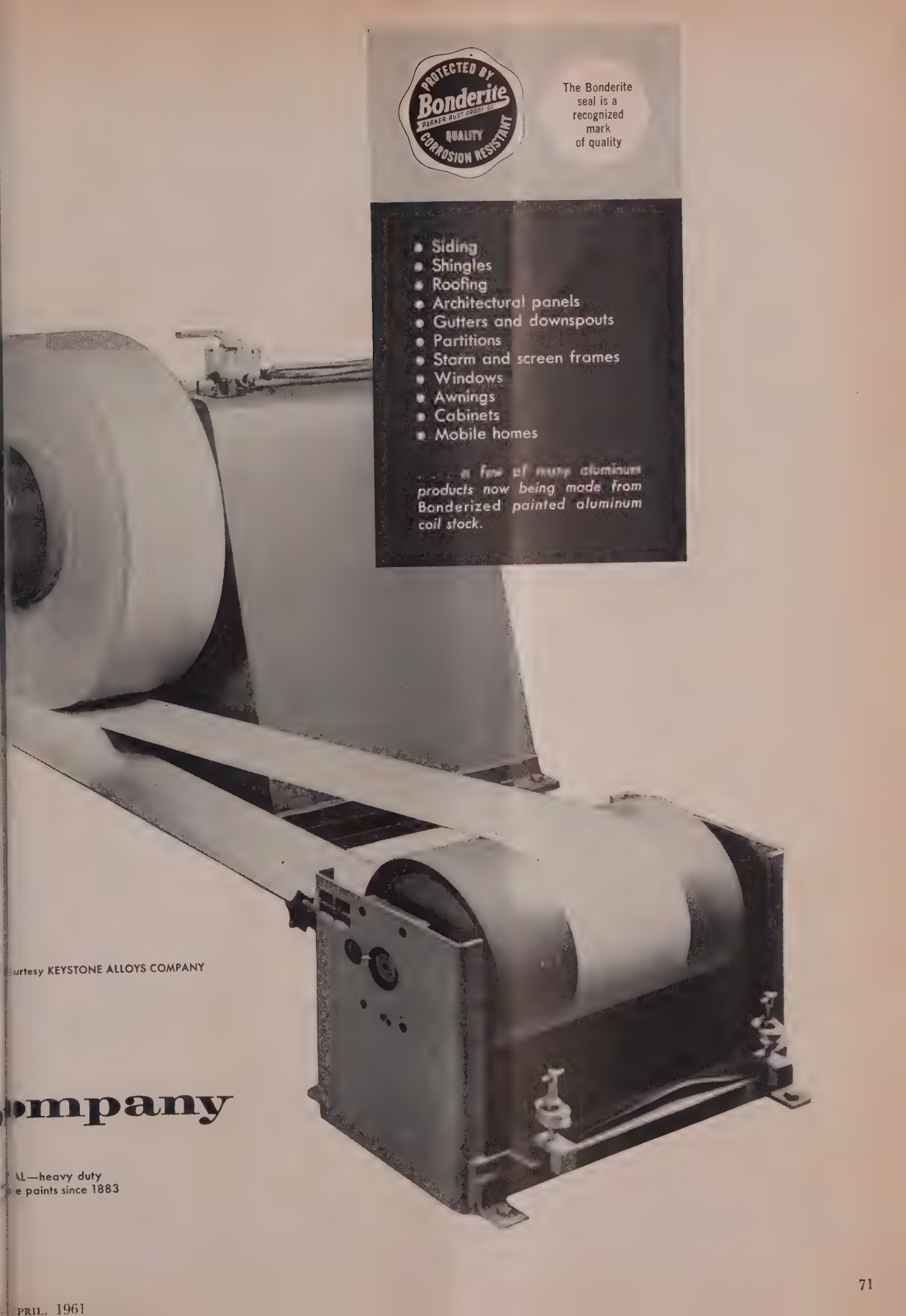
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screws and bolts. Next month we will cover special nuts, studs, washers, inserts, pins, retaining rings, and a few quick release devices.

Rivets: Blind and Otherwise

Most special rivets are of the blind variety, designed for quick assembly where only one side of the work is readily accessible. Example: Attaching slats to tubular aluminum furniture. But many manufacturers now use these versatile fasteners for assemblies in which accessibility is not limited. The usual reason: To reduce fastening time and labor cost.

Some special rivets are primarily high strength fasteners. Others have sealing features for applications requiring watertight or airtight joints. Still others seem to be more closely related to bolts. And then there are threaded insert type rivets that are used in conjunction with machine screws or bolts.

But blind rivets predominate, and most of these are of either the hollow type or the filled-core type. The former are suitable where shear strength of the joint is not critical; the latter are generally used when the assembly must withstand high shear stresses. In both types the upset head is formed by the action of a mandrel or pin that is either pulled or driven through the shank of the rivet.

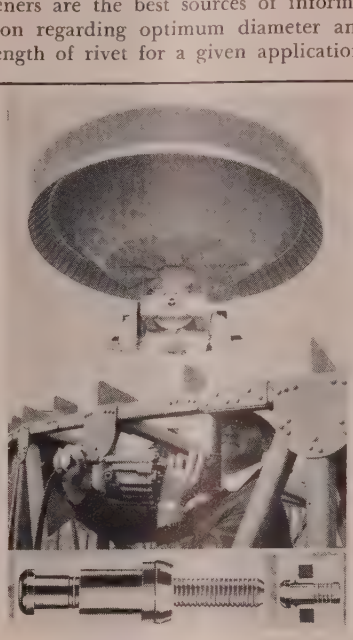
Factors that distinguish various blind rivets include method of setting, shape of the blind end, and type of shank (filled or hollow). The available clearance for the blind end may also govern the type of rivet selected. Some require a substantial amount of clearance; others can be set with as little as 3/16-inch back clearance.

Rivet material is often an important consideration. Most blind rivets are factory assembled 2-piece devices. When joining aluminum components, the portion of the rivet that comes in contact with the workpiece should be aluminum. Most blind rivets are available with aluminum shank and head. The mandrel or drive pin may be steel or aluminum. If possible, however, it's a good idea to use all-aluminum blind rivets in products exposed to the weather or corrosive environments.

Joint design with blind rivets is generally similar to that for standard solid rivets. Edge distance of 1½ to 3 times rivet diameter will usually suffice. Spacing between rivets should be about three times rivet diameter.

Since many blind rivets have hollow shanks, their shear strength is less than that of equivalent solid rivets. This should be considered when calculating stress loads. It is also well to bear in mind the fact that the upset heads in most blind rivets are not as strong in tension as those of standard solid rivets.

Since many aluminum products do not involve high loads in shear or tension, blind rivets will do the job—often at appreciable savings in assembly cost. Manufacturers of these proprietary fasteners are the best sources of information regarding optimum diameter and length of rivet for a given application.



CASE HISTORY: Blind Rivets Hold Giant Antenna Steady

More than 30,000 aluminum blind rivets, type OS by Huck Mfg. Co., Detroit 7, were used in the 3-axis antenna which Philco Western Development Laboratories, Palo Alto, Calif., designed for the U. S. Air Force. The unit receives telemetered information from satellites and missiles in all phases of flight.

The Huck OS is a 2-piece aluminum fastener with a ⅜-inch nominal diameter. The sleeve is 5056-H14 alloy, the pin is 7075-T6. A prime requisite for the antenna is rigidity since it must respond to tracking signals to an accuracy of two milliradians (approx. 0.11 deg). Square aluminum tubing was used to build low deflection characteristics into the structure's framework. The tubing was fastened with Huck blind rivets because they have high shear and tension strength, good clamping action and positive mechanical lock.

A pneumatic tool is used to drive the rivets. Rivet sleeves have integral locking collar heads. As the pin is pulled (shown above) the blind head is automatically formed inside the tubing. The locking collar is then automatically swaged into locking grooves on the pin. Finally the pintail is automatically broken off flush with the collar.

Of all blind fasteners, the "Pop" rivet is one of the most familiar (see case history, page 68). It is moderately priced; available in a good range of sizes (see table in case history); can be set with inexpensive hand tools or high speed pneumatic tools; and can be applied at rates of up to 1200 per hour.

The two basic types of Pop rivets are the open-end, for most applications, and the closed-end style for use when some degree of air- or water-tightness is desired. Head styles include round and countersunk.

The principle on which these rivets work is one of compression. The retracting jaws in any of the setting tools pull the mandrel head into the rivet on the reverse side of the work until the mandrel breaks under tension. The clinch action pulls parts together, exerting up to 600 pounds of squeeze, sufficient for producing tight, vibration-proof fastening.

Tool Cost: Low to Moderate

Equipment investment is comparatively low. Pop rivets can be set with a small lightweight hand tool which sells for less than $18. The maximum cost of a tool—even with interchangeable jaws and attachments for reaching into confined areas—is seldom more than a few hundred dollars.

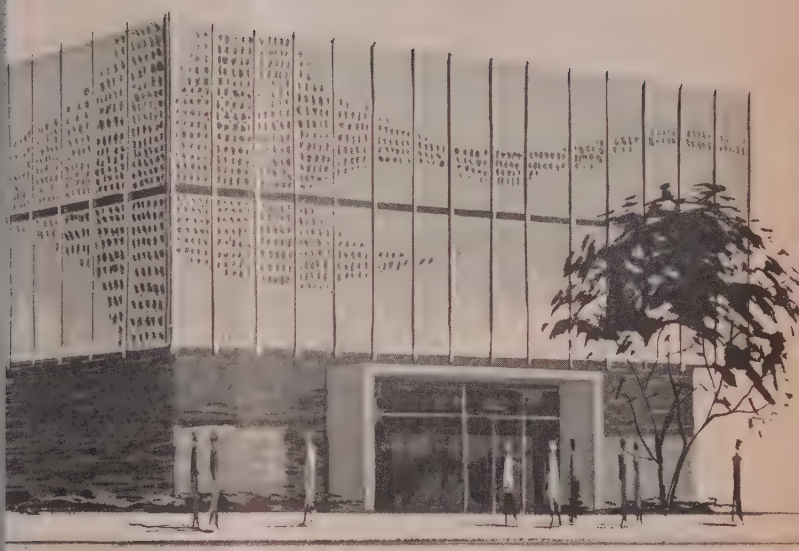
The hand tool comes in two models: one which sets diameters through ⅛ inch in several rivet materials and also sets 5/32-inch rivets of aluminum or aluminum with steel mandrels. The second model sets 3/16-inch aluminum rivets with aluminum mandrels.

The other hand tool is the so-called Lazy Tong. It sets all diameters and lengths of rivets in all materials and with a corner head installed can be used in areas of limited accessibility.

Among the power tools, the most versatile is a pneumatic unit that works from ordinary plant air and will set rivets of all materials from 3/32 through 3/16. Another pneumatic tool is lower in cost, lighter in weight. Known as the "Texan" gun, it operates off plant air, using a pressure as low as 60 psi or as high as 90 psi. It retains peak efficiency even where the connected air hose is as long as 70 feet.

The third power tool operates by a combination of air and hydraulic power. It will pull all rivets through 3/16-inch in diameter. Quick-change nose pieces are available with which the tool can accomplish several fastening jobs. Special heads are available for right angle, deep channel and panel riveting. Supplier of Pop rivets and tools is United Shoe Machinery Corp., Shelton, Conn.

There are several other blind rivets that are similar, though not identical, to the Pop rivet. The "Oscar," a pro-



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assembled hollow rivet with headed pin, is made by Olympic Screw & Rivet Corp., Downey, Calif. It is set by pulling the pin with the jaws of a rivet gun.

Enlarged head on pin expands and upsets the shank to form a solid blind head. Under continued pull, pin breaks clean at serration under head, leaving head firmly seated in rivet shank. Pin is also serrated on pulling stem to insure positive grip by installation tool.

This rivet can be installed with Olympic's Oscar rivet gun, which is available in pneumatic and manual types, priced from $17.95 to $225.00. The gun automatically ejects spent pins and enables operator to install up to 1200 rivets per hour. Most other smooth pin rivet guns can be used. The Oscar rivet is also adaptable to most mechanized riveting operations.

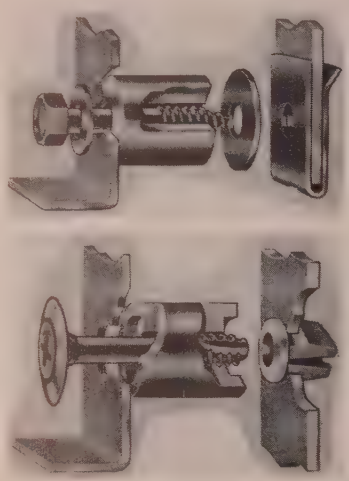
A wide variety of head styles are available in aluminum alloys and mild steel. Grip lengths range from .020 to .648 inches and shank diameters from 3/32 to 3/16 inches.

Olympic makes several other blind rivets with different features. The Pull-Through, for example, does not leave the pin head in the set rivet. After forming the upset head and clinching the assembly, the pin head collapses and passes through the rivet, expanding the shank to fill the hole. This unit is for use where the rivet is not highly stressed.

The Olympic Self-Plugging rivet has an enlarged plug section on the stem. The plug upsets the hollow shank, forming a barrel-shaped head, after which the stem breaks at a preformed notch. This leaves the plug embedded in the rivet, making it a solid member that is comparable in shear strength to a solid rivet.

The same company's Hi-Clinch rivet is designed to form a 4-sided segmented head on the blind side when the pin is pulled. The wide spread of these segments provides a variable grip range and eliminates need for close assembly tolerances. Moderate hole misalignment can be tolerated.

The Hi-Clinch is 5056 aluminum alloy, with pin made of either 2017-T4 or 2024-T4. The others are available in steel as well as aluminum.



CASE HISTORY:

"Sems Screw" Reduces Fastener Costs by 19%

A refrigerator manufacturer slashed fastener costs 19% per thousand, and subsequently shaved labor costs by switching from a conventional connection to a special one.

The problem was to hang an aluminum evaporator assembly on a refrigerator sub-frame. To provide free air flow, a spacer had to be used along the screw shank. The firm had been buying all the conventional pieces it needed for the connection separately: Stainless steel screws, stainless steel flat washer, plastic spacer, stainless steel spring nut, rubber washer (top photo). Total cost per thousand was $68.60, plus labor for component assembly.

Shakeproof Division of Illinois Tool Works, Elgin, Ill., reduced both costs with a special. Shakeproof combined a thread cutting Sems screw with a plastic spacer and plastic grommet (bottom) at a cost of $55.35 per thousand, a saving of $13.25, plus $4 a thousand in labor due to simplified installation.

Huck Rivets; Cherry Rivets

Another company that maintains a sizable stable of special rivets, both blind and otherwise, is Huck Mfg. Co., Detroit. The emphasis here is on high strength fasteners.

The Huck OS Structural Rivet, for example, is a preassembled 2-piece aluminum fastener, the shank of which has an integral locking collar head. When the pin is pulled, it forms the head on the blind side and expands the shank to fill the hole. Then the locking collar is swaged over the grooved end of the pin to provide a fastener with high clamping force as well as high shear strength.

Huck's Conical Keystone Lock Rivet is a filled-core blind fastener incorporating a keystone lock principle that prevents the pin from working loose under vibration or fatigue loads. Huck's Daisy Rivet forms a 5-sided petal type head on the blind side (similar to the Hi-Clinch described above) and a high strength swaged head (like that of the OS Structural Rivet) on the other side.

Huck also manufactures a pull through (hollow-core) rivet and a self plugging type, as well as the Huckbolt which is a cross between a bolt and a rivet, and requires access to both sides of the work (see case history, page 80).

Still another manufacturer of several special rivets is the Cherry Rivet Div. Townsend Co., Santa Ana, Calif. Both the Cherry Pull-Thru Rivet and the Cherry Self-Plugging Rivet are de-

CASE HISTORY: Engine Studs Are Self-Locking

Fifteen Lok-Thred studs (Lock Thread Corp., Detroit) are needed to hold down each cylinder of the aluminum radial aircraft engine crankcase shown above. The studs are driven into tapped holes, with conventional tools.

As a Lok-Thred stud is driven, an interference occurs between the root of the external thread and minor diameter of the tapped hole. The hard stud reworks the threads in the aluminum so a perfect fit results.

The stud's locking threads are shallower than those of standard fasteners, and the root is wider and pitched at a 6° angle. These tapered roots converge toward the direction of load (toward the nut end). Thus, as the stud is driven to the proper depth, loading is reversed by tightening. It pulls against the 6° wedging taper and anchors the stud firmly. Any external load, especially vibration, is said to improve locking action.

In a test, a set of studs required an average of 383 inch pounds of torque for installation. After 599 hours of service the average breakaway removal torque was 651 inch pounds. None of the threads showed signs of scoring; there was no stud loosening; and removal drag of locknuts did not loosen studs.

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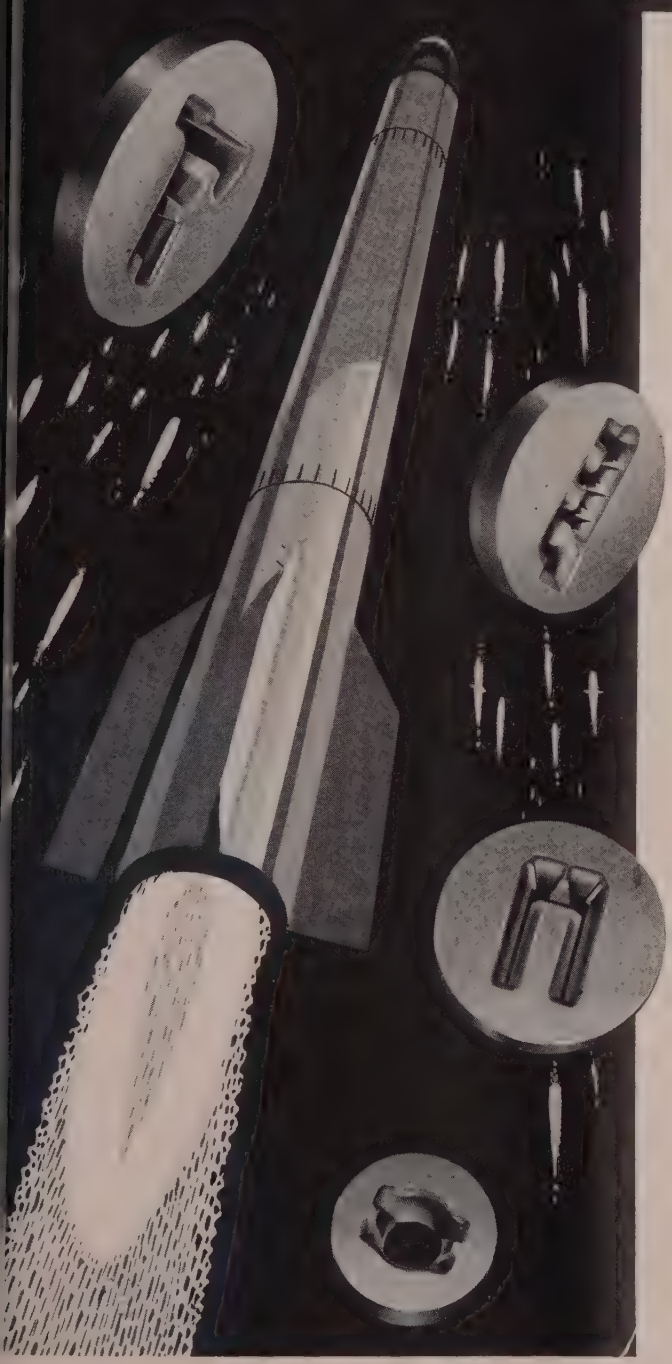

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signed so that the application tool does not contact the work, thus preventing marring of surfaces. Both are produced in aluminum, steel or Monel; are available in ⅛ to 9/32-inch nominal diameters and 1/16 to ¾-inch grip lengths; and with universal, countersunk or modified truss heads.

The Cherrylock Rivet is a preassembled 3-piece blind fastener with mechanical locking ring on the pull stem. When the stem is pulled it upsets the blind head, draws the parts tightly together, and expands the shank to fill the hole. The locking ring is then forced into place and the stem breaks off flush with the head. Locking ring prevents the core from working loose under vibrational loads.

A tubular blind rivet that can be installed at high rates of speed is the Chobert Rivet made by Avdel, Inc., Burbank, Calif. The upset head of this simple 1-piece fastener is formed by a flared mandrel in the application tool. Special automatic riveting machine takes up to 95 rivets per loading; drive them at rates of up to 2000 per hour.

Another type of blind rivet that i manufactured by several companies i the drive rivet. Proprietary types hav differing features, but the principle o operation is basically the same.

Drive Rivets Hammered In

The drive rivet consists of a hollow rivet body preassembled on a drive pi that protrudes above the manufacture head. When the rivet is inserted in hole and struck with an ordinary ham mer, the pin is forced down into th shank, which is usually slotted at it lower end so that a segmented head i formed on the blind side of the work In most types the shank is expande somewhat to fill the hole, and som provision is made to lock the drive pin in place.

Obvious advantages: Simple toolin (an ordinary hammer); fast installation easy application in the field; no finish ing required; no broken-off pins to di pose of; and good shear strengt imparted by the locked-in pin. Th driven head, however, may not hav very high strength in tension. Thi should be considered when specifyin these rivets.

Manufacturers of drive rivets in clude: Star Expansion, Mountainvill N.Y.; Olympic Screw & Rivet Corp Southco Div. of South Chester Corp Lester, Pa.; Huck Mfg. Corp.; and Th Deutsch Co., Los Angeles. The la two feature the Deutsch Rivet, a hig strength stainless steel fastener. Th others make their drive rivets in alum num as well as steel and other metal

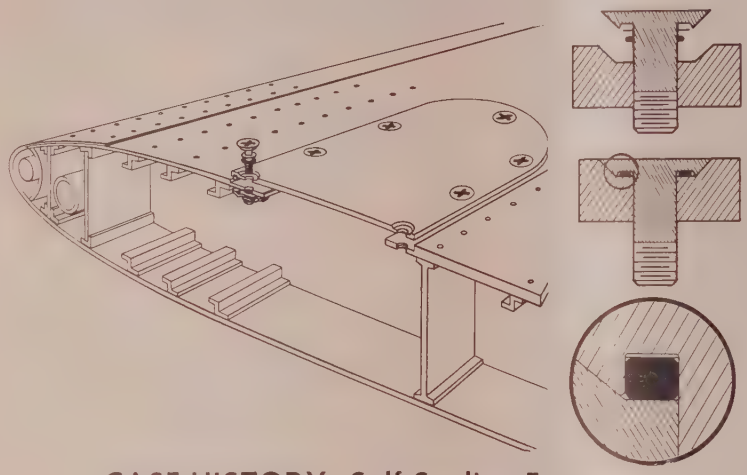
Speedy Explosive Rivets

A fastener that's in a class by itse is the DuPont Blind Expansion Rive It looks like an ordinary solid rive except that a tiny explosive charge run the full length of its shank. The riv is inserted in a hole and touched wit a soldering iron or other heat sour to activate the charge. The explosiv action forms the blind head and e pands the shank to fill the hole.

Advantages: Simple tooling; hig setting rates (up to 25 a minute); wid grip range with same size rivet; n finishing needed; very little back clea ance needed; and good strength.

The industrial variety of this faste er is produced in aluminum (50 alloy), brass, and nickel plated bra There are two head styles — modifie brazier and 100° countersunk; four d ameters — ⅛, 5/32, 3/16 and ¼-inc and several grip ranges from ⅛ to 1 inch. Exclusive outlet is The Bowma Products Co., Cleveland 3. Bowma also supplies application tools.

(Continued on page 7



CASE HISTORY: Self-Sealing Fastener Eliminates Gooping Compound on Aircraft

Fastener engineers at Lockheed Aircraft Co. found conventional seal dome nuts inadequate for sealing access doors on the Electra. But the Uniseal Fastener of Aero Bolt & Screw Co., Inc., Ingleside, Calif., licked the problem. Uniseal is said to offer a positive seal and still provide 100% metal to metal contact between fastener and fastened component.

Old-style dome nuts required extensive gooping to prevent minute leaks. This meant adding extra weight—sometimes to no avail since the gooping tended to crack under stress, or the nut failed due to deflection of the nut retainer. Also, if an installation error was made the entire riveted nut plate assembly had to be ripped out, and old goop scraped away before a change could be made.

Self-sealing Uniseals eliminate the goop, sharply reduce installation time and cut costs because fasteners applied without goop can be reused.

The sealing system includes a groove in the underside of the head, a teflon washer and an O-ring (top drawing at right). The teflon washer is naturally slippery, permitting the fastener head to spin freely during the last few turns of applied torque so that the O-ring will properly seat itself in the groove. There's no danger of undetected cold-flow or galling which might ruin the seal. The O-ring is available in any sealing compound specified.

This sealing method can be incorporated into almost all types of threaded fasteners. Substituting the seal material permits a single fastener to be used to contain any media at any temperature or pressure encountered in the aircraft industry.

The fastener itself has the same maximum torque, tensile and shear characteristics of its Air Force-Navy Aeronautical or National Aircraft Standard counterparts. It requires no special tool for application and comes with slotted, Phillips and torque set recess heads. Uniseal ranges in size from No. 8 through ½; comes in steel; cad-plated steel; stainless; brass; and anodized aluminum.

The drawing above (left) shows an access plate being installed with Phillips head Uniseal fasteners, 100° countersunk. At right (top), are the sealing system elements. The second drawing shows the installed fastener, the circled area is the sealing system in action (the bottom picture is a close-up of this).

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Not all special rivets are blind fasteners. The Hi-Shear rivet, as its name implies, is essentially a high performance fastener designed for use where maximum shear strength is required. It is said to have three times the shear strength of an equivalent solid aluminum rivet. Its strength in tension is also very good.

The Hi-Shear is a 2-piece fastener that requires access to both sides of the work. The pin, with a manufactured head at one end and an annular groove at the other, is made of a material that is too strong and hard to be upset. (Materials include heat treated steel, stainless steel, titanium, and 7075-T6 aluminum alloy.) The collar is made of a more malleable alloy—usually 2117 or 2024-T4 aluminum.

In application, the pin is placed in the hole so that the annular grooved end protrudes, and the collar is swaged over this end, locking the pin firmly into place. Conventional riveting guns or squeeze riveters are used, but they are fitted with special Hi-Shear rivet sets. Any excess collar material is trimmed and ejected by this rivet set.

The Hi-Shear is used for joining thick members. Its properties would be wasted on thin sheets with low bearing strength.

Manufacturers of the Hi-Shear include Hi-Shear Corp., Torrance, Calif.; Pheoll Mfg. Co., Aviation Division, Los Angeles; and Voi-Shan Mfg. Co., Culver City, Calif.

Insulating; Sealing Rivets

The Insulet rivets made by Pylon Co., Attleboro, Mass., are conventional solid or semi-tubular rivets whose shanks and under-the-head surfaces are coated with nylon insulation. They are used primarily in applications where two electrical conductors must be attached to a common insulated base, yet must be insulated from each other.

Among the sealing rivets, an unusual design is the Fluid-Tight Slug Rivet made by Pastushin Industries, Inc., Los Angeles. This is a 2117-T4 aluminum rivet with a soft jacket and head washer of 1100 alloy. When the rivet is driven—by conventional methods and tools—the soft jacket serves as a positive air- or water-tight seal. Full rivet strength and joint efficiency are developed.

Another sealing rivet is Riv-O-Seal, by Franklin C. Wolfe Co., Inc., Culver City, Calif. It looks like a conventional 100° countersunk rivet, except that the head is slightly undercut and supplied with an O-ring sealant—usually silicone or black nitrile rubber. When the rivet is driven the sealant is compressed in the triangular void between the rivet head and the counterbored joint member. Standard rivet material is 2117-T alloy.

Among the internally threaded rive the Rivnut is probably the most famili type (see case history, page 82). Pu pose of the internally threaded sha of this device is to accommodate t threaded mandrel of the pull-up to However, the installed fastener can a serve as a tapped hole for a standa screw or bolt.

CASE HISTORY: String-of-Screws Speeds Assembly

An unusual approach in power driving of threaded fasteners is Screwstick, developed by The American Screw Co., Willimantic, Conn. The fasteners are supplied in stick form — from 24 to 60 identical hex head screws, linked together like a string of sausages.

A lightweight pneumatic driver (see photo) takes a full stick of screws and feeds them to the work one at a time. The operator positions the work with one hand; operates the driver with the other. The necked-in portion of the stick—the part that separates the screws—breaks at a specific torque value. This prevents over-driving; insures uniform tightening of screws regardless of the operator's skill. As each screw is fully driven, the necked portion breaks and the next screw is automatically advanced to the driving position. The rotating point of the fractured neck burnishes the head of the just-driven screw.

The big advantage is speed of operation — said to average as high as 60 driven screws per minute. Screwstick is available in fastener sizes from No. 0 to No. 6 in both coarse and fine thread series. Standard lengths range from 1/16 to 3/8 inch. Screwsticks are available in machine screw, thread forming and thread cutting types in aluminum, steel, brass, nickel, silver and stainless steel.

Principal uses are in electrical and electronic assemblies, precision instruments and apparatus, cameras, meters, and the like.

Special Screws and Bolts

A staggering array of special thread fasteners confronts the design engine or production manager who is seeki ways to trim assembly costs or enhan the appearance or performance of product. But the problem is not tough as it may seem at first glan Most of these devices are designed be self-locking; it's the manner in whi this aim is achieved that distinguish them.

Some special screws and bolts are p marily sealing fasteners. Others featu exceptional mechanical properties su as high strength in shear or tensio Most special nuts are of the self-locki variety, but some boast additional tributes such as high speed assemb special wear resistant threads, etc. Th are also several insert-type nuts that a pressed, driven or otherwise forced in the workpiece to form an integ thread.

Considering special screws first, a go start is the popular Sems screw. Patent by Shakeproof Division of Illinois To Works, Elgin, Ill., and licensed to so 40 other fastener manufacturers, t Sems screw is used extensively in t appliance, automotive, electrical a other mass productions industries.

Its unique feature is the pre-assembl washer (case history, page 74), which placed on a standard screw blank. Wh the threads are rolled, they hold t washer close under the head, preventi it from falling off, yet permitting it rotate freely so that it will seat its properly when the fastener is applie

Obvious advantages are: Elimina time-killing manual assembly of scre and washers on the job; no danger missing washers in an assembly; no h ard of loose washers falling into t works (in a washing machine, for ample); and no separate inventory screws and washers.

Other advantages accrue when Se with special washers are used. With o of the many Shakeproof lock washe for example, a tight, vibration-pro assembly is achieved. The teeth of th washers also serve as a safety devi preventing over-tightening of the scr during driving.

With neoprene or nylon washers, t Sems screw becomes a sealing ty fastener. Many other washer types a

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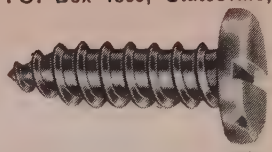

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Carriage Bolts • Hanger Bolts • Dowel Screws • Wood Screws

available, and the fastener itself may be a tapping screw, a machine screw, a sheet metal screw or a wood screw in virtually any of the standard or special head styles.

Originally developed for high speed assembly operations, the Sems screw can be driven by Shakeproof Division's hopper-fed power driving machines. These machines handle fastener sizes ranging from No. 2 through ¼-inch: can drive screws at rates of up to 60 per minute.

The standard Sems screw is unfinished mild steel, but these versatile fasteners are available in other materials including 2024-T4 aluminum.

Similar to the Sems is the Springtite screw of Reliance Division, Eaton Mfg. Co., Massillon, Ohio. This standard machine screw has a helical lock washer trapped just under the head by the rolled threads. It, too, can be applied by hopper-fed automatic machines, and is available with other types of washers including spring lock, ribbed, wide bearing, and plain.

Springtite sizes range from No. 4 through ½-inch; lengths from 3/16 to 1½-inch. Materials include aluminum, mild steel, alloy steel, stainless steel, and brass. Washers are made of these materials, as well as silicon bronze, phosphor bronze and Monel.

The Spin-Lok screw (Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.) is locked into the assembly by integral teeth on the underside of the head. The teeth are angled on the advancing side so that the fastener is easily tightened flush to the surface, but cut vertically on the other side to prevent loosening. About 20% more torque is needed to loosen the screw than to tighten it.

This fastener is said to hold tight under heavy vibrational loads or alternating dimensional changes caused by repeated heating and cooling. It is produced in several head styles (including countersunk) and can be applied by hopper-fed machines.

Standard sizes range from No. 4 through ½-inch for hex head screws; No. 4 through ⅜-inch for other types. Standard material is steel, and various protective finishes are available.

Long-Lok; Nylok; Thredlock

Another approach in self-locking screws is offered by Long-Lok Corp. Los Angeles 46, Calif. The Long-Lok screw is a standard machine screw with a longitudinal plastic insert that is deformed when the screw is run into a tapped hole. Compression of the insert increases the drag between mating threads, hence the self-locking action.

The insert does not project beyond the basic diameter of the screw; is not damaged in installation; hence, can be reused several times. The insert's tapered end facilitates starting of the screw, and its long length maintains pressure-tight integrity of the joint.

Long-Lok is produced in aluminum, steel, stainless steel, and brass; various insert materials are matched to differing temperature requirements. Standard sizes range from No. 4 through ⅝-inch diameter, and several head styles are stocked.

A similar locking principle is employed in the Nylok screw (Nylok Corp. Paramus, N. J.). This, too, is a standard machine screw, but the locking insert is a nylon pellet that projects beyond the major diameter of the thread. When the screw is installed the nylon pellet is compressed.

A short time after installation, the nylon "remembers" to return to its original shape. Thus the locking action is stronger than it was at the time of installation. The pellet also seals against leakage, permitting use of less expensive tapped through-holes.

Nylok is produced in aluminum, steel, stainless, brass, and bronze; in a wide variety of head styles including socket heads and set screws; and in sizes from No. 0 on up.

The Thredlock screw by Centra Screw Co., Chicago 9, has one or more bulges or nubbins in the thread to produce a wedging action when the fastener is installed in a tapped hole. The bulge does not damage female threads; in

CASE HISTORY: Huckbolts and Honeycomb Panels Trim Weight of Missile Launcher

Structural joining of aluminum honeycomb panels with Huckbolts minimized the on-deck weight of the ASROC missile launching system developed for the Navy by the Armament Division of Universal Match Corp., St. Louis, under the direction of the U. S. Naval Test Station, Pasadena, Calif. Paneling was formed of 7075 aluminum alloy skins with bonded cores of aluminum honeycomb. The two-piece Huckbolts are shear and full tension type fabricated of AISI 4037 alloy steel, and were supplied by Huck Mfg. Co., Detroit.

For installation (sequence illustrated above), the pin is inserted (A), the collar slipped over the end of the projecting pintail, and the tool applied (B). The tool jaws pull the pin as the tool anvil pushes against the collar (C), and as the pin is drawn into the hole it fills it with a close tolerance fit. Pulling continues and the collar collapses under the tool's force (D) and swages into locking grooves on the pin, giving a positive mechanical lock. Continued pulling breaks the pin flush with the end of the collar (E), producing a neat, clean installation (F).

One man, using either hydraulic or pneumatic tools, can drive 12 to 15 Huckbolts a minute. Two men can reach speeds of 30 per minute. The ASROC launcher shown above is aboard the USS Norfolk, and is loaded and ready to fire. It is an eight-cell pepperbox design, each cell serving as a combination missile storage magazine and launcher.

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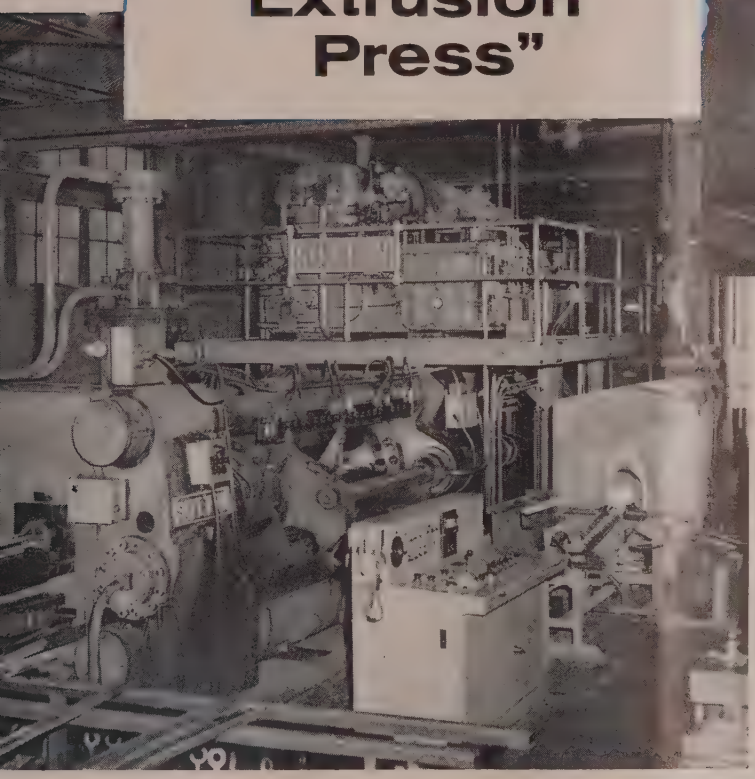

So says Charles D. Fetter (seated) shown with Paul L. Fetter co-owners of Greater Louisville Industries and Fetter Bros. Aluminum Mfg. Corp. of Jeffersonville, Indiana.

Their new "Sutton" is a 1650 ton horizontal extrusion press for high-speed production of extruded aluminum solid and hollow shapes. Designed for fully automatic operation, an auxiliary control panel mounted on the front platen makes possible operator control of extrusion speed and all press functions while closely observing the work as it emerges.

Yes, if its a "Sutton", customer satisfaction starts with fast start-up after installation, includes quality construction and design features and is emphasized by the high production records all Sutton equipment helps make possible.

Typically, Fetter points out: "We are well pleased with our Sutton installation. Dead cycle time is extremely quick. We like the 6" x 30" billet and the optional containers making it possible to extrude 7" or 8" diameter billets. We appreciate the rigid construction and fully automatic operation. The press was in operation within a week after delivery and we have extruded up to 5000 lbs. per hour which we feel is extremely good."

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parts strong resistance to loosening by vibration. The fastener is produced in several head styles (also studs and set screws) and in sizes ranging from No. 2 through ½-inch.

Interference Locking

Still another self-locking approach is the Lok-thred principle, licensed to several manufacturers by Lock Thread Corp., Detroit 11. Applied to nearly all types of threaded fasteners, this principle is based on a modification of the standard 60° thread form. It has a larger root diameter and a wider root surface that's tapered 6° longitudinally to the axis of the thread.

This modified thread root forces metal in the mating thread to flow upward as the Lok-thred fastener is driven. The result is an interference fit that not only locks the threads together, but also imparts a pressure-tight seal. The Lok-thred usually needs a surface that is harder than that of the mating thread. The wider root surface is said to have a lower notch sensitivity than the standard root form (see case history, page 74).

Plastic Locks Standards

Ordinary non-locking fasteners can often be locked firmly in place by a plastic liquid sealant that hardens automatically when squeezed between close-fitting metal surfaces. Called Loctite, and manufactured by The American Sealants Co., Hartford 6, Conn., the material is available in various grades for different torque-strength ratings. Break-loose torque is about 20% higher than tightening torque.

Fasteners locked in by Loctite are said to have superlative resistance to vibration, yet can be removed with ordinary tools. The hardened material retains about 85% of its strength at 212°F; 50% at 350°F. It hardens to full strength in 12 to 48 hours, depending on the grade used.

Self-Sealing Screws

Some self-locking fasteners such as Long-Lok and Nylok mentioned earlier are also self-sealing. When a critical application requires a more positive sealing action, however, you may be better off with something like the Uni-seal bolt shown in the case history on page 76.

Another self-sealing fastener is the Tuff-Tite screw of Townsend Co., New Brighton, Pa. Especially suitable for attaching roofing or siding to buildings, Tuff-Tite is a standard screw with a neoprene washer assembled in its slightly undercut head.

Since the washer is thicker at its I.D. than at its outer periphery, the fastener is suitable for placement in the valley section of corrugated roofing or siding. Tightening of the screw compresses the washer against the threads, insuring a more positive seal. The shorter screw thus used to fasten corrugated roofing or siding is said to save as much as 50% in fastener cost, compared with the considerably longer screw usually employed to fasten through the crest of the corrugation.

Tuff-Tites include tapping screws, machine screws, wood screws and drive screws in a wide range of sizes, head styles and materials.

The Seelskrew by Automatic and Precision Mfg. Co., Yonkers 5, N. Y., is a stainless steel fastener with a silicone rubber O-ring positioned in an annular groove in the underside of the head. When the fastener is driven tight the O-ring is compressed, providing a tight seal against pressures as high as 500 psi for screws, and 2500 psi for bolts.

A somewhat similar principle is employed in Bolt-O-Seal, by Franklin C. Wolfe Co., Inc., Culver City, Calif. However, this is a 100° countersunk head with Phillips recess. Metal-to-metal contact between bolt head and part permits use of the fastener's full clamping torque.

Topseal for Building

Still another sealing fastener for building uses is Topseal by Fabricated Products Co., West Newton, Pa. The standard tapping screw, bolt or nail is preassembled with a special washer consisting of neoprene bonded to metal. When the fastener is tightened the neoprene flows snug against the shank, producing a water- and weather-tight seal. The metal washer provides a free spinning surface for the fastener head.

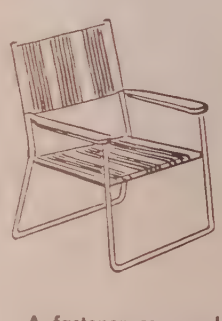
Topseal is produced in many fastener types, sizes and materials, but the standard tapping screw is probably the most common variety. Like the Tuff-Tite, it can be installed in the valley of corrugated roofing and siding. It is installed with either standard drivers or special power tools and accessories.

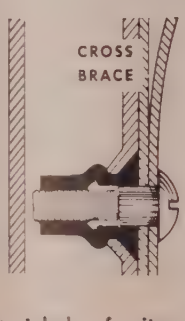
The Neo-Bond screw, by Atlas Bolt and Screw Co., Cleveland, is similar in construction to the Topseal. It has a contoured neoprene sealing element bonded to a conical dished metal washer. When fastener is driven, the neoprene is compressed against the shank of the stainless steel screw. This not only seals the joint, but also prevents marring of enameled finishes and deadens vibration.

A new fastener that looks promising is the Phil-Slot screw recently announced by Abbott Screw & Mfg. Co., Chicago 26. As its name implies, this fastener has a combination Phillips and slotted head; can be driven or removed with

CASE HISTORY:

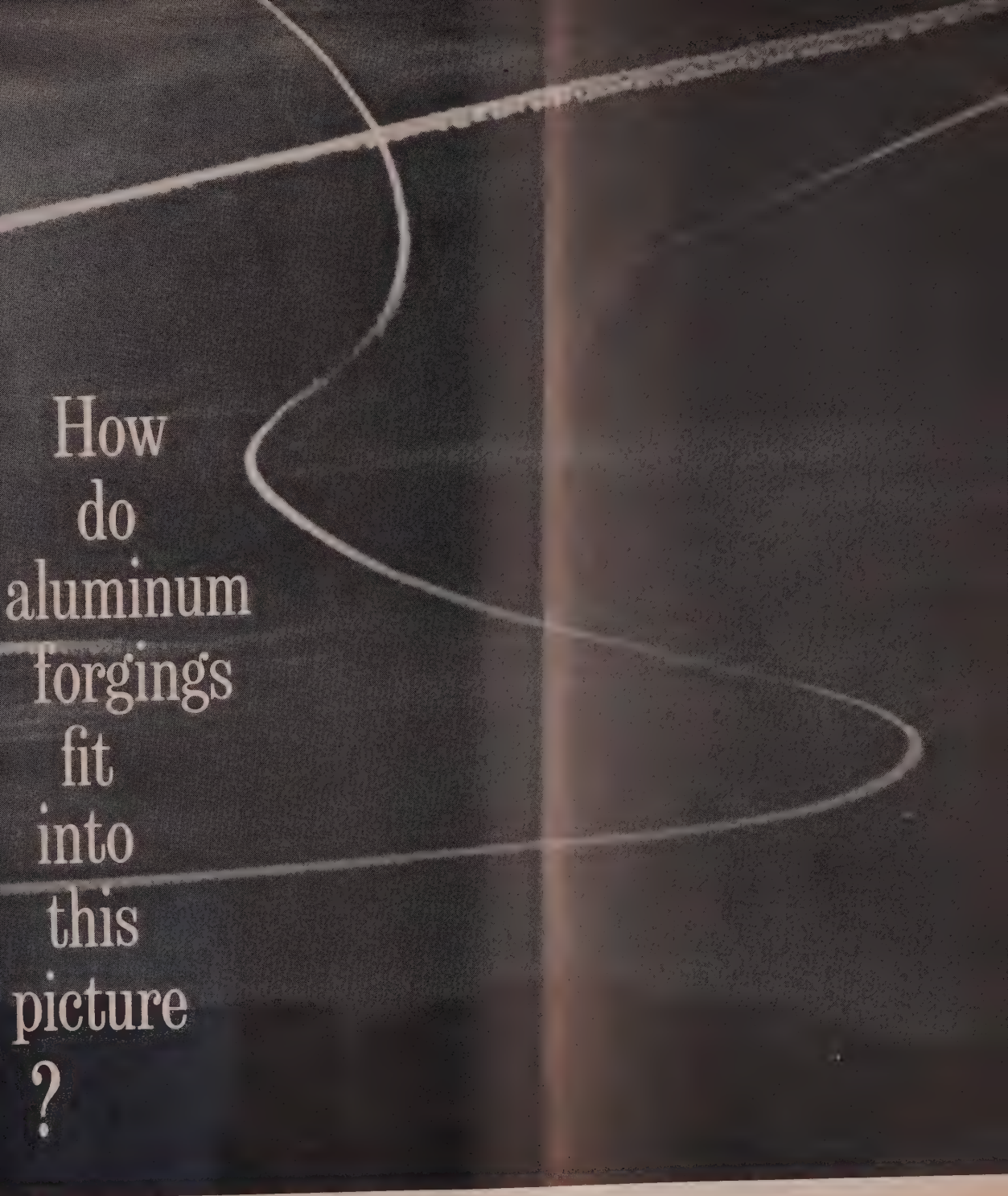
Blind Rivets Fasten Tubular Furniture





A fastener commonly used in manufacturing aluminum tubular furniture is the one-piece, internally threaded, blind rivet called Rivnut, by B. F. Goodrich Aviation Products, Akron, Ohio. Rivnut is upset inside the tube, and acts as both a rivet and nut plate. This eliminates nuts, bolts, etc., improving product appearance. Flat and countersunk head styles are used on furniture. To install flat heads, punch or drill a proper sized hole then drive the fastener. For countersunk installation, drill an undersized lead hole, countersink, drill the finish sized hole with a sharp drill, then install the Rivnut.

Power or hand tools can be used. One special hand tool (it costs about $10) has a rotating, threaded mandrel which completely engages Rivnut threads. It's simple to work: Push the handle knob in to engage the Rivnut, squeeze the lever and the fastener is headed, pull the knob outward and the tool disengages, leaving threads intact. Inside the tube: The Rivnut, on the mandrel, enters the hole; as the mandrel retracts, it pulls the threaded portion of the fastener shank back toward the inner wall of the tube and a bulge starts to form at the unthreaded shank area. The fully retracted mandrel completes the bulge (drawing at right) locking the Rivnut. Rivnuts come in aluminum, steel, stainless, and brass, with threads ranging from 4-40 to 5/16-18.



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either a Phillips driver or an ordinary slot screw driver.

Self-Drilling Screws

Self-tapping screws most commonly used on aluminum products were covered earlier (MM, March '61, p. 76), but there are some unorthodox types that are well worth considering. An example is Uni-Point by Universal Screw Co., Evanston, Ill.

With its hard needlepoint, this fastener both drills and taps its own hole. Obvious advantage: No need to pre-drill or pierce holes. There are several types, but the Awn-Seal screw is of most interest to manufacturers of aluminum products.

Developed primarily for awnings, carports and other products made of precoated aluminum sheet, the Awn-Seal is supplied in colors—blue, yellow, red, green and white are standard—and has an undercut washer head that takes a special sealing compound. When the fastener is driven, the compound is forced up into the cupped head, producing a watertight seal.

The compound is said to be resistant to temperatures of −100° to +220° F. Phillips and hex heads are standard. Material is type 410 stainless steel.

Another self-drilling sheet metal screw is Spee-D Screw, by Air Control Products, Inc., Coopersville, Mich. Its needlepoint pierces its own hole when pressed against sheet metal, after which the fastener is driven in conventional manner.

Said to be applicable to sheet metal up to .050-inch thick, Spee-D Screw is produced in sizes No. 6 to No. 10, and in lengths of ⅜ or ½-inch.

Still another self-drilling and tapping screw is the Tapit, by Parker-Kalon Division of General American Transportation Co., Clifton, N.J. An added feature of this time-saving fastener is the serrated underface of the washer head, which serves as a torque brake to prevent stripping of threads once the screw is seated.

Before leaving special screws, an item that's worth mentioning is the Alcoa Finishing Head Screw. Developed for ornamental and architectural work, this fastener has a standard flat countersunk head with a raised rectangular key which is sheared off after the screw has been driven. The screw head and surrounding area are then ground and polished or otherwise blended to make the fastener all but invisible.

Sizes range from No. 4 through ⅜-inch diameter; lengths from 3/16 to 3 inches.

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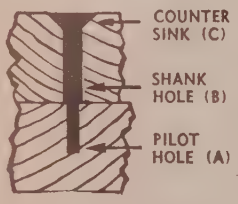
Pilot Holes and Clearance Holes for Wood Screws*

*Recommended. Slight deviations may be necessary in some cases.



No. of Screw	PILOT HOLES (A) — HARD WOODS — TWIST BIT (Nearest size in fractions of an inch)	PILOT HOLES (A) — HARD WOODS — DRILL Gauge No. To be used for maximum holding power	PILOT HOLES (A) — SOFT WOODS — TWIST BIT (Nearest size in fractions of an inch)	PILOT HOLES (A) — SOFT WOODS — DRILL Gauge No. To be used for maximum holding power	SHANK CLEARANCE HOLES (B) — TWIST BIT (Nearest size in fractions of an inch)	SHANK CLEARANCE HOLES (B) — DRILL Gauge No. or Letter To be used for maximum holding power	COUNTERSINK (C) — NO. OF AUGER BIT To Counterbore for sinking head (by 16ths)
0	1/32	66	1/64	75	1/16	52	—
1	—	57	1/32	71	3/64	47	—
2	—	54	1/32	65	3/32	42	3
3	1/16	53	3/64	58	7/64	37	4
4	1/16	51	3/64	55	7/64	32	4
5	3/64	47	1/16	53	1/8	30	4
6	—	44	1/16	52	9/64	27	5
7	—	39	1/16	51	5/32	22	5
8	7/64	35	5/64	48	11/64	18	6
9	7/64	33	5/64	45	3/16	14	6
10	1/8	31	5/32	43	3/16	10	6
11	—	29	5/32	40	13/64	4	7
12	—	25	7/64	38	7/32	2	7
14	9/64	14	7/64	32	1/4	D	8
16	—	10	9/64	29	17/64	I	9
18	13/64	6	9/64	26	19/64	N	10
20	7/32	3	11/64	19	21/64	P	11
24	1/4	D	3/16	15	3/8	V	12

The most common malpractice in the application of wood screws is the failure to provide pilot holes and clearance holes. Provision of properly sized holes is essential whether assembling two or more wood components or attaching aluminum parts, such as hardware, to wood.

When assembling two wood parts, clearance holes large enough to freely accommodate the screw shank should be drilled in the top member. (Recommended sizes of twist bits and drills for various sizes of wood screws are given in the accompanying table.) Needless to say, aluminum components should also have adequate clearance holes to avoid fouling of the screw threads. (In cast hardware, such holes are usually cored in the casting, thus eliminating a drilling operation.)

Pilot holes are provided in the lower member of the assembly. For soft woods, the pilot hole should be equal to about 70% of the root diameter of the screw. For hard woods it should be about 90% of root diameter. (Recommended sizes of twist bits and drills for various screw sizes are given in table above.) If the pilot hole is undersized the screw may tend to drive the members apart rather than draw them together. Depth of pilot hole is usually about half the length of the threaded portion of the screw. Be sure the screw length is at least 1/8-inch less than the combined thickness of members to be joined.

Courtesy Southern Screw Co., Statesville, N.C.

Artist's rendering of a B-L-H Loewy water-hydraulic extrusion press

What you should know about B-L-H Loewy extrusion presses

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News Products and People

Roll-Up Tubes Made From Rotary Cast Strip

Collapsible aluminum tubes, some 750,000 of them, are being produced each day on the recently completed integrated facility of White Metal Mfg. Co., Hawthorne, N. J. The tubes are used to package toothpaste, shaving cream and other household and industrial products.

The tube making facilities include the newest addition to the plant, a rotary unit for casting aluminum strip. From this strip slugs are blanked which are fed into impact extruding equipment which slams the slugs into tubes, or in some cases, into rigid containers such as aerosol cans.

The Hawthorne factory will supply aluminum slugs for its own tube production, and also to White Metal plants in Hoboken, N. J., and Indianapolis, Ind.

The new installation, which is adjacent to the tube plant, was engineered by White Metal, in close cooperation with Aluminium Limited's engineers. Aluminium Laboratories Limited has been working on the new rotary casting process in Canada and England for more than five years.

In the tube plant 99.8% ingot is put into a gas-fired furnace of 7000 pounds capacity, melted and drawn out through a trough or "launder" to a slowly revolving casting wheel (above).

The 40-inch wheel has on its face a mold cavity 8 inches wide and three-quarters of an inch deep. Molten metal is poured into this cavity, where it is contained by a steel belt and gradually solidified by being sprayed with water as the wheel turns.

The aluminum emerges from the wheel cavity as a strip ¾ inch thick by 8 inches wide and goes directly to the first of two rolling mills. After being rolled down, the finished strip, ranging in thickness from .150 to .250 inch, is automatically wound into 1000 pound coils which are delivered to the automatic slug-blanking press.

This press blanks out slugs at the rate of 25 to 30 pounds a minute. These are conveyed through a washer and annealing oven, then taken to the adjoining impact extrusion presses.

Forecast Record Use of Aluminum for Mobile Homes

Manufacturers of mobile homes and travel trailers will consume some 40 million pounds of the light metal in 1961 for exterior sheathing, including side panels and roofs, according to a survey by Aluminum Co. of America.

George E. Herrman, Alcoa's mobile homes industry sales manager, said that the projection is based on an estimated 150,000-unit production year.

Edward L. Wilson, managing director of the Mobile Homes Manufacturers Association confirmed the production estimate when he said: "Shipments of mobile homes and travel trailers this year will be somewhat ahead of 1960 deliveries, which by our estimate totaled 142,000 units worth approximately $575,600,000.

"The anticipated record use of aluminum in mobile homes for this year," Herrman said, "will surpass even the amount consumed in the banner year of 1959, when 162,000 mobile homes and travel trailers were produced."

Consumption of about 40 million pounds of aluminum for 1961 will exceed last year's total by 15%. Continuing increases in mobile home production, and expanded use of aluminum, should stabilize the aluminum usage curve in a steadily upward direction.

"The development of high quality, pre-painted aluminum sheet was instrumental in prompting mobile home producers to increased use of aluminum," Herrman added. "The esthetic and economic virtues of pre-finished aluminum sheet are so captivating that many producers now employ it. Six out of seven mobile homes display aluminum exteriors and a large portion of these are pre-painted. Even so, we do not think aluminum has reached the saturation point."

For instance, the Alcoa survey does not include the substantial amount of aluminum utilized in doors, windows, and other mobile home accessories such as cabanas and awnings.

Lightweight Cart Has Many Uses

Tote-Chair was designed by a hunter to carry deer carcasses, but it has many other possible uses, according to Charles M. Noble, president of the New Oxford Aluminum Co., Inc., New Oxford, Pa. Noble's firm casts the high tensile aluminum wheels for the Tote Chair and owns Tote & Chair Products Co., P.O. Box 176, Hanover, Pa., which fabricates aluminum tube to make the chair.

The Model 25 Tote Chair is pictured. The frame is 1-inch O.D. 6061-T6 tubing. When unfolded, the chair or Deer Cart, measures 14 inches high, 14 inches wide and 54 inches long. It will fold up for carrying in a "hunter's red knapsack" 4 inches deep, 14 inches wide by 16 inches long.

"This chair was originally designed for the deer hunter," Noble said, "but can be used for camping, golf cart, fishing, hauling outboard motors or aluminum canoes or small boats."

Noble also sees its use as an emergency litter in large plants. The Model 25, and a slightly larger model, 27, are guaranteed to carry 300 pounds in distributed weight. The larger model weighs only 10 pounds.

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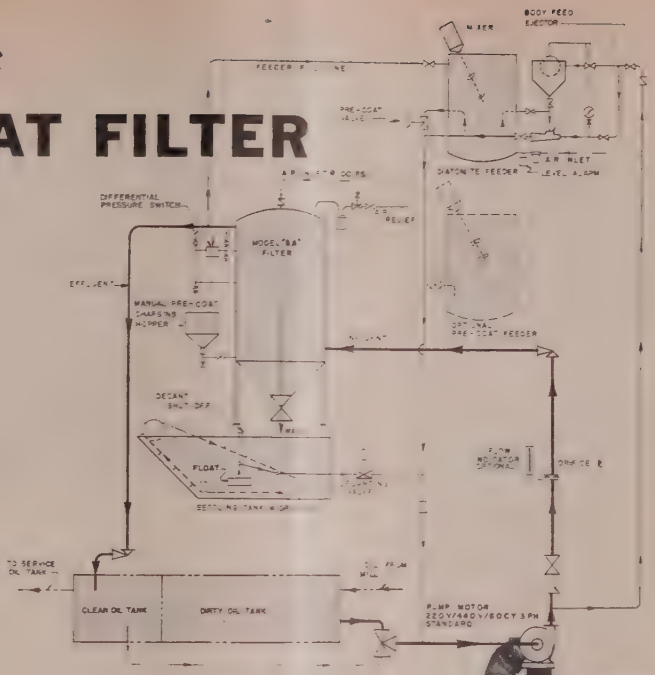

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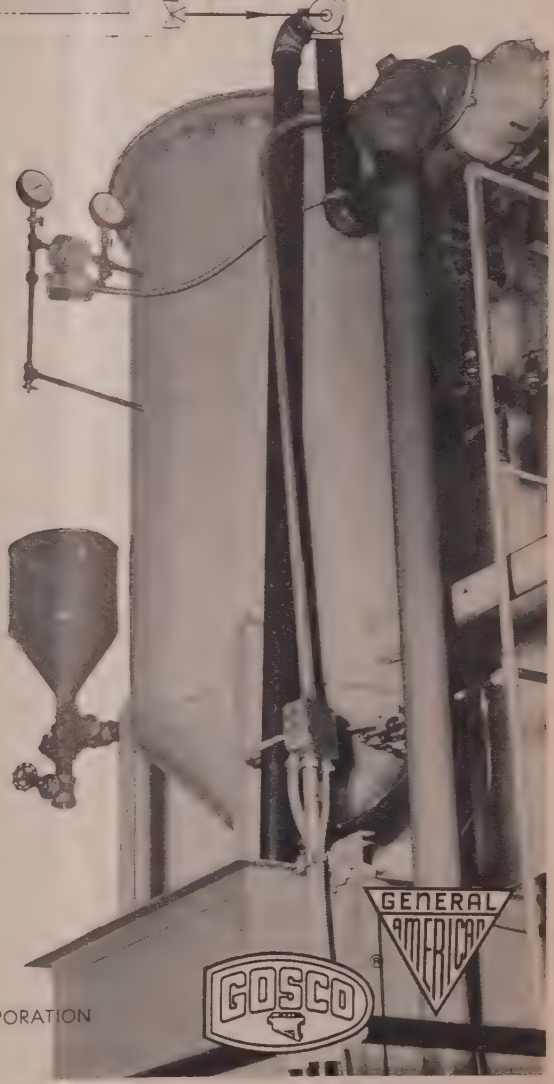

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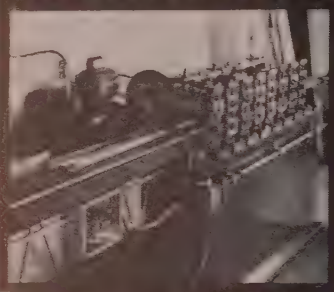

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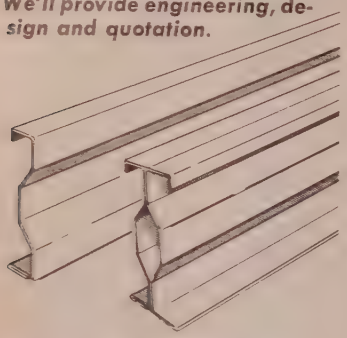

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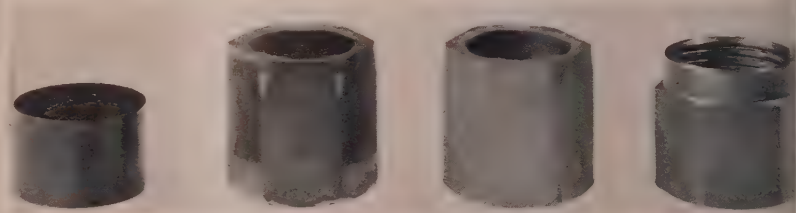
Fiberglass Filters Impurities from Molten Metals

Development of high efficiency fiberglass fabrics for the filtration of impurities from molten metals, especially aluminum, was recently announced by Irwin J. Gusman, manager of the Industrial Glass Fabrics Department of J. P. Stevens & Co., Inc., Broadway at 41st St., New York 36.

Known as Superflow, these fabrics take advantage of a high twist yarn principle to increase the number of interstices and thereby increase flow rates substantially, while effectively filtering impurities. The relatively less expensive glass fabrics replace expensive alloy steel screens which must cleaned periodically. Superflow gl fabrics are economically discarded a replaced after pouring the batch.

Fabricated bags and socks made Superflow are available through W. Criswell Co., 611 N. 15th St., Philad phia. Superflow is used (above) to filt impurities from molten aluminum in t Lobeck Billet Casting machine install recently at California plant of Micha Flynn Mfg. Co. Insets show texture Superflow (left), and a fabric ba (right) used for various types of al minum filtration equipment.



Titanium Aircraft Fittings Cold Extruded by Battelle

Low-cost manufacture of titanium fittings are said to be possible with precision cold extrusion techniques developed by Battelle Memorial Institute, Columbus, Ohio, for the Manufacturing and Materials Technology Division, Air Materiel Command Aeronautical Systems Center, U. S. Air Force.

The titanium part used in a pilot run at Battelle was a No. 10 size hexagonal nut for MS-type aircraft quality flareless tube fittings, normally produced in steel or aluminum entirely on automatic screw machines. Production of titanium fittings by machining has been so costly that their use has not been justified. The Battelle process has cut this cost almost in half.

Full-size hexagonal cups were backward extruded in a single operation from solid cylindrical AMS 4902 unalloyed titanium billets 1-inch diameter by ⅝-inch thick. The operation involved 55% extrusion reduction and require a pressure of about 335,000 psi. T hexagonal cups, measuring 1-inch acr the flats by 1-inch long with 25/32-in bore. were then finish machined a threaded on a screw machine.

Not only is the starting billet us in cold extrusion only half the weight the one needed for screw machinin but it also can be cut from rou barstock instead of the more expensi hexagonal barstock. Material cost f an AMS 4902 titanium No. 10 nut pr duced by cold extrusion with scre machine finishing amounts to $.64 co pared to $1.52 for a nut produc exclusively by screw machining ope tions. Comparing over-all manufacturi costs, preforming the nut by cold e trusion and finishing on an automa screw machine yields a net cost savi

5% over the conventional method
king the nut completely by screw
ne methods.

ıer hydraulic fittings and female
ıers should be adaptable to fabri-
n from titanium by cold extrusion,
ng titanium parts more competi-
with other metals, say the Battelle
llurgists, who created the process—
Fiorentino, P. D. Frost and A. M.
)ff.

addition to significant cost savings
ıaterial and labor, the cold extru-
process also offers the advantages
onsiderable strengthening through
hardening and excellent surface
ıes and close dimensional control
ıe as-extruded condition.

)ld extrusion has been applied
ly to aluminum, brass, and steel.
ral years ago, Battelle demonstrated
feasibility of cold extruding titan-
in a program also sponsored by the
Force. The aim of the current pro-
ı was to establish the necessary
: technology for cold extruding
al parts from titanium on a com-
cial basis. The studies were directed
nly toward reducing the pressure
ıirements. The variables studied
punch design, billet shape, and
ication.

The photo shows the titanium nut
various stages of production (from
to right): The lubricated barstock
; as extruded hexagonal cup; va-
blasted hexagonal cup; the finished

otor Frame, End Shields
nodized for Protection

The aluminum construction of a new
e of 400-cycle induction motors cuts
ir weight about 75%, according to
manufacturer, Doerr Electric Corp.,
7 No. 4th Ave., Cedarburg, Wis.
The motor pictured is typical of
e line, being a 12.5 hp motor with
full load speed of 7300 r.p.m., and
ving a total weight of less than 25
unds. Frame diameter is 6½ inches.
Doerr motors in this series weigh
ly about one-quarter as much as
nventional cast iron and sheet steel
)tors having the same ratings. The
ame and end shields are aluminum,
ecially heat treated to obtain the de-
ed strength, and anodized for corro-
)n resistance.

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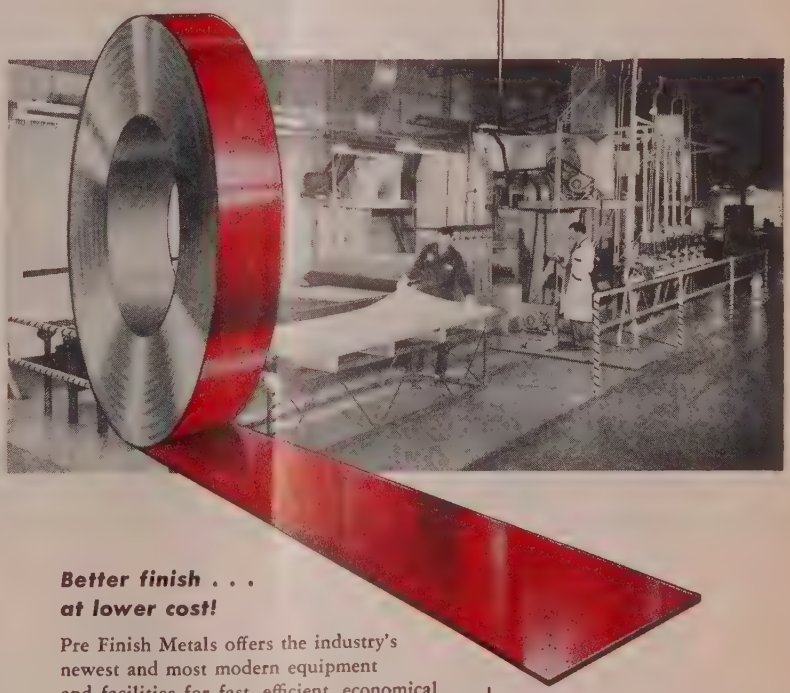

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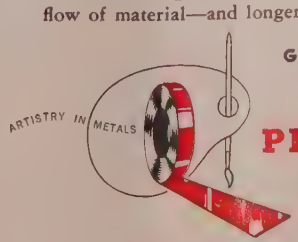

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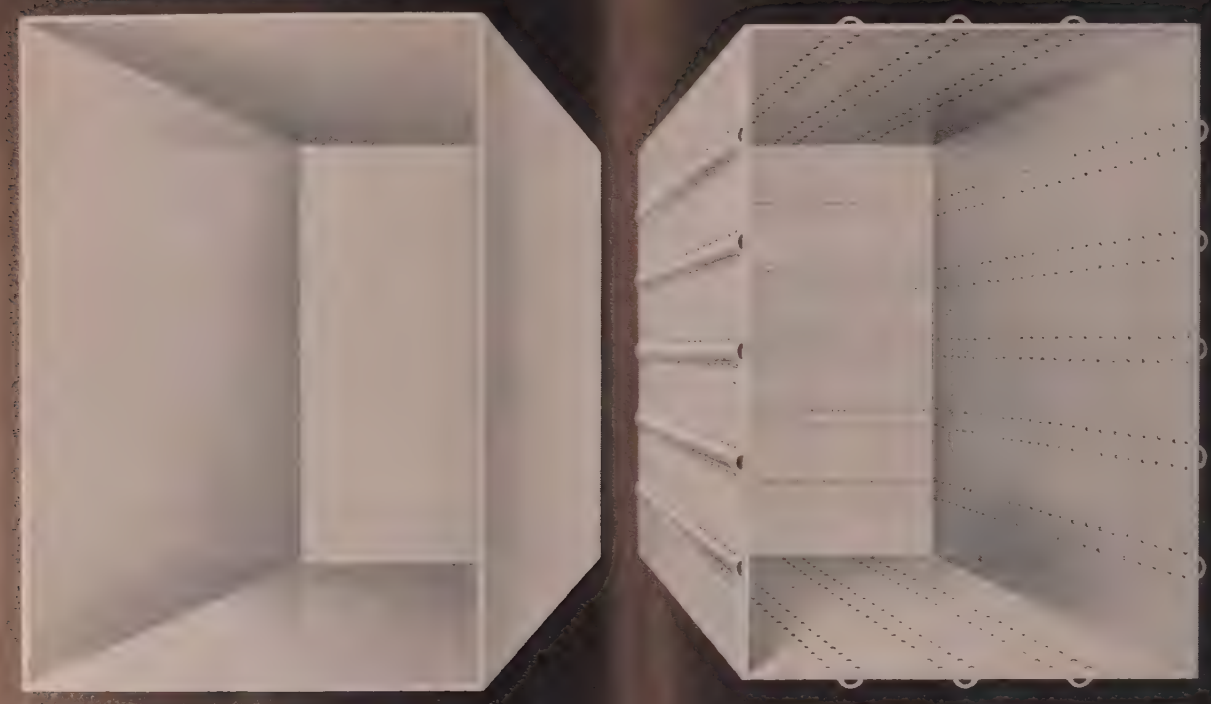


NO-RIB

RIBBED

Thick-gauge magnesium sheet is so rigid that time-consuming rib stiffeners and fasteners are eliminated. Yet the magnesium panels are light and strong, resist dents and punctures better than thin-skinned ribbed construction.

WHICH HIGH-STRENGTH DESIGN WEIGHS LESS... COSTS LESS TO BUILD?

Magnesium no-rib, of course. By increasing the sheet thickness slightly, designers of containers and vehicle bodies get a tremendous boost in rigidity, thus can eliminate stiffening ribs. And since magnesium is the lightest structural metal, the resulting unit weighs less than conventionally-designed structures using other metals. (No-rib design in other metals introduces a severe weight penalty.) Magnesium no-rib structures are smooth-walled, minimize crevices for water seepage, have greater cubic capacity pound-for-pound than ribbed units. For detailed information on using magnesium no-rib construction for fabricated units of all types, write THE DOW METAL PRODUCTS COMPANY, Merchandising Department 1108CQ4, Midland, Michigan.

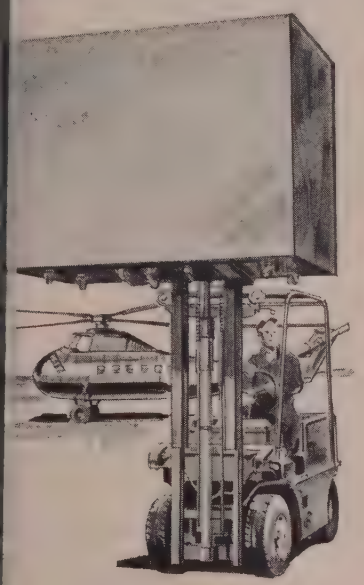
DOW

THE DOW METAL PRODUCTS COMPANY

Division of The Dow Chemical Company

DOW

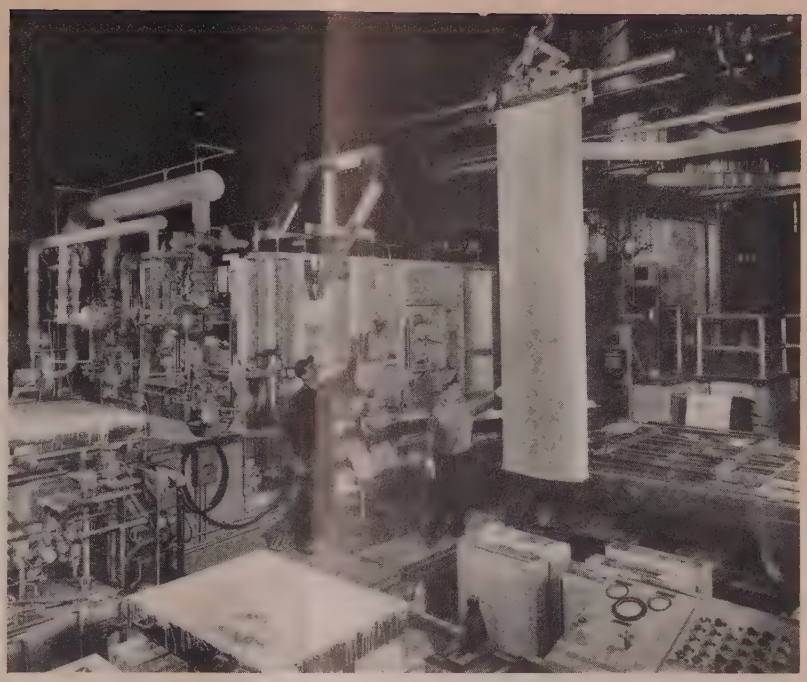
HOW MAGNESIUM NO-RIB DESIGN CUTS CONTAINER COSTS AND WEIGHT



go containers can be made both ng and light . . . and at less cost . with magnesium no-rib design. ricated from stiff sheets of light- ght magnesium, container walls d no stiffening ribs or supports. lo-rib design eliminates costly, e-consuming installation of ribs fasteners . . . provides strong, t-resistant walls that are smooth de and out . . . produces econom- containers that, pound-for-pound, e greater cubic capacity than ed containers of any other metal. Dow magnesium sheet alloy ZE10A deal for no-rib construction. It vides high welded-joint strength *needs no stress relief* after welding. equipment handling and cargo tainers, storage bins, vehicle ies, magnesium no-rib construction rs maximum strength at lightest ght . . . and savings in construction e and costs!

DOW

DOW METAL PRODUCTS COMPANY
ivision of The Dow Chemical Company
Midland, Michigan



Quaker Slab Caster At Full Production

Following a brief "breaking-in" period, a large slab casting and sawing installation is now in full production at the aluminum sheet rolling mill of Quaker State Metals Co., Lancaster, Pa.

The semi-continuous casting station and the circular slab saw with auxiliary conveying equipment were supplied by the Loma Machine Mfg. Co., Inc., New York. Capable of producing six 7½ inch by 144 inch aluminum alloy slabs simultaneously, the casting machine turns out all the ingots required for the processing of sheet, strip and coil.

Continuously cast slabs are claimed to be greatly superior to those cast in conventional book molds, because grain size of the cast material can be controlled by regulating casting speed.

For subdividing and trimming the 12-foot-long sheet ingots, Quaker State uses a Loma high-speed circular saw capable of cutting through a 12 inch by 52 inch aluminum section in one minute. The saw is mounted on an overhead sliding carriage and has a 48 inch diameter blade which has a speed of 6000 sfm.

The sawing installation is fully mechanized, and includes a slab charging conveyor, an automatic length stop, a slab discharge conveyor and chip removal.

Coating Protects Metals Enroute, During Handling

Strippable coating offers a defense against scratches or surface damage commonly encountered during customer handling and fabrication of metal products, says Aluminum Co. of America.

Alcoa's strippable coating is a transparent vinyl that is roll-coated on sheet at thicknesses of 1.5 - 2.0 mils. Once the fabrication or shipment is completed, the coating can easily be removed by hand stripping or by an air blast between the coating and metal.

Alcoa says the coating will help protect sheet used by the building, automotive and appliance industries. Many surfaces can similarly be preserved at considerable savings to the fabricator, who in the past, relied on tape or other costly protectives to keep the metal free of mars, stains, or other surface damage.

Strippable coating is available on coiled sheet in the thickness range of .016 - .051 inch, and widths of up to 56 inches. Alcoa claims it will not leave a residue or affect the metal; allows inspection of the surface without removing the protection; insures a uniform and controlled coating thickness; affords a high degree of plasticity and toughness which permits corrugating and drawing without marring the metal surface, and substantially increases the customer's recovery of the finished product; and finally, material furnished with a quality finish needs no costly "dress up" operation by the customer due to normal handling damage.

In addition to coiled sheet, strippable coating also is available on a number of sheet patterns and flat sheet.

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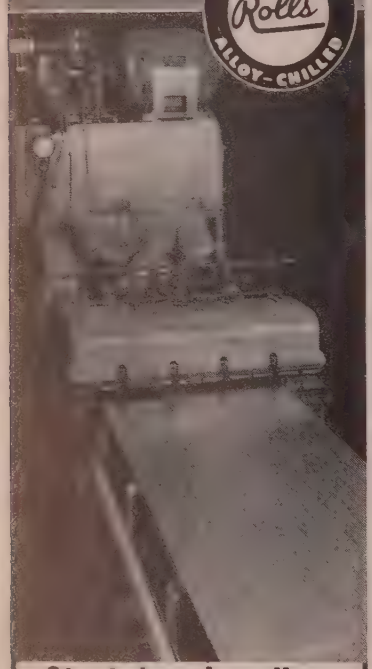
Rolling Mill Equipment
RED CIRCLE Rolls ALLOY-CHILLED



Stretcher Levellers

Complete range of stretching capacities from 150 to 750 tons, for levelling ferrous and non-ferrous sheets in sizes up to 120" wide x 500" long.

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Hyde Park
FOUNDRY & MACHINE CO.
ROLLS
GRAY IRON CASTINGS

Florida Fabricator Enters Equipment Field

A leading Florida aluminum fabricator in the building products field has branched out into the manufacture of fabricating equipment. Florida Industries, headquartered in Tampa, has organized the Roll Form and Equipment Div'n. One of its products is pictured.

"This machine makes interlocking, self-supporting panels for patio covers," said John L. Liner, vice president, sales. "It is a 9-pass machine, approximately six feet in length, weighing about 3000 pounds. It is fed by a conveyor system which shears, notches and pre-punches the panels for attachment to supporting members of the patio cover."

Charles Frizell, chief engineer of this division, heads a design team with over 35 years of experience in roll form machine and production line design and engineering.

Florida Industries, manufacturer of aluminum fascia, soffit, gable ends, gravel stops and residential siding and roofing panels, is a heavy supplier to the 2000 homes being built in the Jacksonville area by Hercules, Inc.

Florida Industries lately has given considerable attention to development of special manufacturing equipment. A recent machine of the company's is a continuous honeycomb expanding, cutting and laminating machine which has enabled the company to enter the field of honeycomb sandwich panels.

A strong factor in Florida Industries' new technological bent is Paul Hoffman, chief engineer of the company's subsidiary, Modular Panel Mfg. Co. Hoffman was previously affiliated with Jacobs Aircraft Engine Co., Piasecki Helicopter Corp. and Westinghouse. According to Florida Industries, he designed and built the first and only continuous fiberglass corrugating machine, on which he still holds basic patents. He has designed other equipment to facilitate working aluminum. His efforts at Florida Industries have contributed greatly to the firm's efficiency.

Metals Department Established By Dow

Formation of a new Metals Department in The Dow Chemical Co. of Midland, Mich., has been announced by H. D. Doan, executive vice president.

W. J. Rave, manager of magnesium production in Dow's Texas Division, has been named manager of the new department. Hilary A. Humble has been appointed sales manager, Metals Department.

The Metals Department will be responsible for various Dow activities in magnesium and other primary metals. This includes the development of primary magnesium for die casting, chemical uses of magnesium, etc.

The new department will be separated from The Dow Metal Products Company Division, which remains responsible for processing and fabrication of aluminum, magnesium, and other metal products.

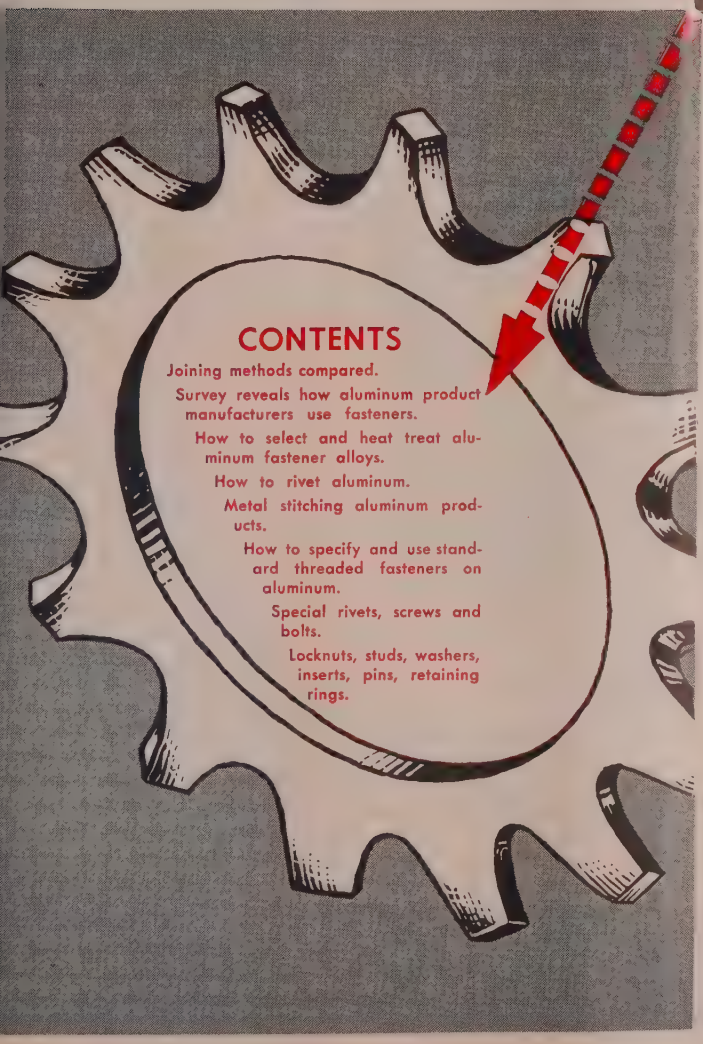
With the establishment of this department, Dow's Magnesium Sales now will be known as Metals Sales. It will handle the sale of primary magnesium, alloy ingot, and cast anodes, as well as other metals.

William S. Loose, who has been serving as manager of Magnesium Sales, has been assigned to Dow's corporate Industrial Relations staff.

aving trouble
astening Aluminum?

'll find most of the answers in this 44-page nual, based on Modern Metals' compre- sive series of articles on How to Fasten minum. (Part 4 starts on page 68 of this e; complete contents of Fastening Manual given below.)

ies of this valuable booklet will be avail- e late next month at $1.00 each for up to copies; 75 cents each for larger quantities. order in advance, use order form at right.



CONTENTS

Joining methods compared.
Survey reveals how aluminum product manufacturers use fasteners.
How to select and heat treat aluminum fastener alloys.
How to rivet aluminum.
Metal stitching aluminum products.
How to specify and use standard threaded fasteners on aluminum.
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4/61

Boeing Will Use More Magnesium Tooling Plate

Boeing Airplane Co., has signed the first industry contract for volume delivery of magnesium tooling plate. Under the agreement, concluded between Boeing and the Dow Metal Products Co., Division of the Dow Chemical Co., Boeing will realize cash savings based on volume use of the material.

Significance of the contract is that Boeing can expand its use of magnesium tooling plate at a guaranteed price averaging approximately 20% lower than previously. Terms of the agreement envision increased use of the material by all Boeing divisions.

Boeing pioneered the use of magnesium tooling plate in 1957, some three years after its introducion to the market. Reason for the company's interest was a prospective saving through lower material cost per equivalent volume, faster machining and greater handling ease (magnesium is one-third lighter than aluminum). Other advantages include ease in welding, dimensional stability and vibration damping capacity. An evaluation report recommended stocking magnesium tooling plate and designing tools, jigs, fixtures and other items with magnesium in mind.

Today, all Boeing manufacturing departments around Seattle are using magnesium tooling plate. A substantial portion of tooling for 707 jetliners, KC-135 jet tanker-transports, and the Bomarc missile is magnesium. Included are wing locator jigs, master template table, welding fixtures, door locating fixtures, dummy doors, fuselage and trimming fixtures and bonding assembly jigs.

In vibration test, use of magnesium plate has permitted utilization of test fixtures otherwise impracticable.

New Use for Magnesium Reported from Canada

Seventy-thirty magnesium alloy in the form of sintered pellets is finding increased use in the production of ductile iron in Canada. A popular size is 1-inch diameter x ⅞-inch, weighing 1½ ounces, according to Dominion Magnesium Limited, 320 Bay St., Toronto, Ont. the leading producer up there, who reports there is no loss by breakage or fines.

"The reaction is steady but vigorous," Domal said, "and this composition is designed for use with correctly designed plungers incorporating ladle cover and skirt. With this equipment Domal pellets produce the lowest cost and highest quality ductile iron."

Domal said that the pellets are in use with irons of sulphur conte as low as 0.015 and as high as 0. The weight of additive required c readily be obtained from a form based on this experience. One hund pounds of iron requires magnesi equal to 2.8 times the sulphur conte plus .04 pound. Since the Domal al is 30% magnesium, the weight of pell to use per 100 pounds of iron is 9.33 plus .133 pound, the smelter repo

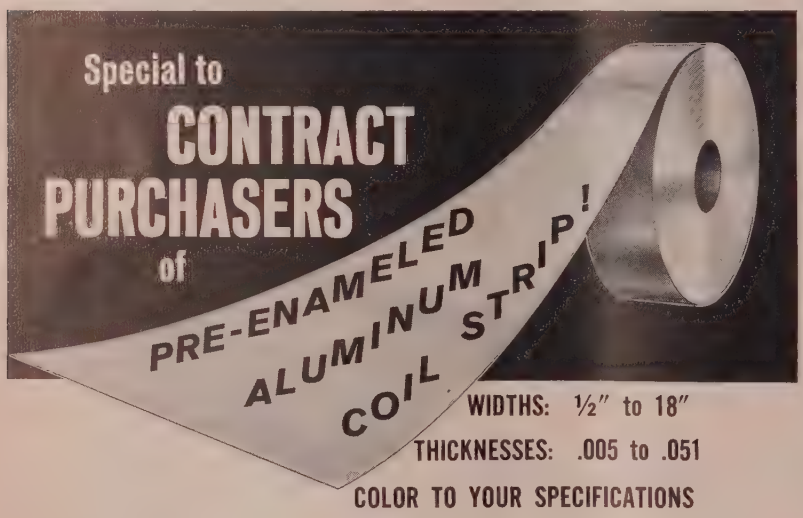
X-Rays Used to Speed Sheet, Foil Production

X-ray gauges for automatic thickn measurement and control are said save material, increase uniformity, a cut costs in producing aluminum sh and foil. This is what Weston Inst ments Div'n of Daystrom Inc., N York, says its installation does at Mi Aluminum Co., Manitowoc, Wis.

Mirro has installed XactRay gaug manufactured by Weston, on two mi in its new Wisconsin plant. One gau permits automatic operation of a inch hydraulically adjusted foil mill speeds up to 2000 fpm. Another gaug installed on a heavy duty, 60-inch c mill—not only maintains tolerance sheets through regulation of screwdo rolls, but also automatically compe sates for shifts from one aluminum loy to another.

Mirro's fabricating and packaging erations use about 40 million pounds aluminum sheet per year. This mean manufacturing variation of 0.0001 in on the average gauge rolled could res in excess usage of 160,000 pounds metal per year, points out Mirro.

Above, an adjustment for foil t speed is made by Charles J. Meyer, m foreman, on Mirro's 48-inch mill. C trol panel also houses console equ ment for the XactRay gauge which me ures and controls sheet thickness au matically once operating speed is tained. Gauging instrument is non-c tacting, employs X-rays which impart residual radiation, says Weston.



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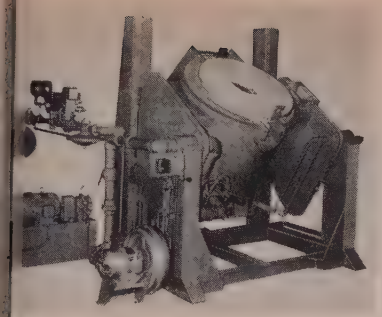

elting Furnace Has proved Lip Design

The aluminum furnace shown above designed and built for one of the Three auto manufacturers for eximental melting of aluminum at eptionally high temperatures. A duct of the Warwick Industrial rnace & Engineering Corp., 452 W. icago Ave., Chicago, it is designated del WCT-4.

According to Warwick, an innovation the crucible furnace is the stationary or "nose pour" feature which aes a constant pouring arc. This elimtes the need of moving the ladle furnace front at any time during the ire pour and contributes to safer, ter pouring with a minimum of metal vel between furnace and ladle.

Warwick reports that the furnace is de with these types of tilting mechan: Hoist tilt or powered tilting, either chanical or hydraulic. The company s that temperature controls assure solute control of any desired metal ndition," and that all or any type combustion safeguards and controls available designed to comply with derwriters codes.

These furnaces are built to handle m 125 to 2000 pounds of aluminum d may be fired by oil, gas or combina- n oil-gas burners.

abricator Wins issile Container Contract

Metal shipping and storage containers the U. S. Army's Hawk missile will built by General Bronze Corp., Gar- n City, N. Y., under a $1 million conct to Raytheon Co.

The 1900-pound aluminum and steel ntainer will minimize the danger of mage to the missile by shock or vibran during handling and shipment. It ll also permit storage of the missile outdoor areas of intense heat or cold.

The Hawk Missile Single Tactical ntainer is 18 feet long and 36 inches diameter. It approximates cylindrical ape and opens at one end. This dean permits tier storage and lends itlf to quick, easy selection and withawal of missiles either for actual emerncies or servicing.

Fabricator Expands Building Products Line

Concurrent with the recent move into its new plant and offices at Charlotte, Mich., General Aluminum Products, Inc., formerly of Eaton Rapids, has installed its own roll forming equipment to produce aluminum residential siding.

Marketed under the company's "Care-Free" trade name, the siding line includes horizontal and vertical styles, both hollow and insulated. It is offered in six low gloss thermosetting acrylic finishes, applied by reverse roller-coating. Panels are pre-notched at both ends, eliminating the need for performing this operation in the field.

According to Richard Trumley, president, the addition of aluminum siding fits well into the company's product line which now includes combination storm windows and doors, awnings and jalousie windows, and patio and porch enclosures.

Trumley pointed out that for the past two years the National Association of Home Builders (NAHB) has selected Care-Free combination doors for use in the association's Research Homes. And Care-Free siding was recently specified for use at the Kincheloe Air Force Base project being built at Kinross, Mich.

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Anodized Foil Comes Coiled

Anodized foil is available in gauges from .002 to .040 inch in clear, black and all standard colors, matte or polish finish, with or without adhesive backing, any width to 24 inches, from Girder Process Inc., 102 Hobart St., Hackensack, N. J.

The foils can be used for decorative trim, nameplates, knob inserts, bezels, perforated metals, expanded metals, etc.

GP anodized foils can be printed, lithographed, etched and embossed. Adhesive linings are available for solvent reactivation and permanent bonds, or pressure-sensitive types.

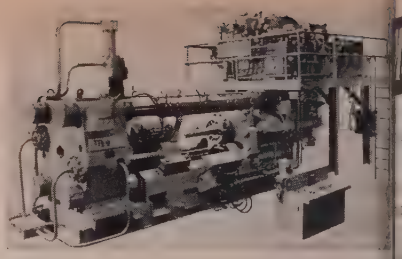
Aluminum Piping Cuts Sugar Handling Costs

Aluminum piping is used extensively in a new sugar handling system installed at the Blackpool factory of the Daintee Chocolate Confectionery Co. Ltd., who, since adopting this system, have reduced costs by as much as $11.20 per ton of sugar used and have also gained production space previously used for storage.

By this system, granulated sugar is transported to the factory in bulk in a special tanker vehicle which is fitted with an air compressor to blow the sugar through piping to two main 20-ton storage hoppers inside the factory. The aluminum piping, which is of 4 inch nominal bore, is supplied by Alcan Industries Ltd., Banbury, England.

A pneumatic conveying system is also used for transferring the sugar from the main hoppers to several subsidiary hoppers within the factory. Aluminum piping is again used but with a 3 inch inside diameter.

The savings of $11.20 per ton were due to the lower price of sugar delivered in bulk and to lower handling costs.



Giant Press Extrudes 5000 Pounds Per Hour

An extrusion press at the Greater Louisville Industries plant at Jeffersonville, Ind., is setting new high production records for extruded solid and hollow aluminum shapes according to Charles D. Fetter and Paul L. Fetter, co-owners of Greater Louisville and Fetter Bros. Aluminum Mfg. Corp. The press has extruded 5000 lbs/hr.

The press is a 1650-ton horizontal extrusion press equipped with electronic servo controls for fully automatic operation. It was manufactured by Sutton Engineering Co., First National Bank Building, Pittsburgh 22. An auxiliary control panel mounted on the front platen makes possible operator control of all functions including extrusion speed, container opening and closing, operating die slide, stopping main ram and emergency stop. The operator, from a position near the platen, may regulate extrusion speed while closely observing the work as it emerges, which is important when extruding hollows.

Dead cycle time, including time for spraying the die, is arranged to permit shearing immediately after stripping. While the main ram is returning, the die may be sprayed.

Two variable pumps permit overlapping of all functions and make possible single pump operation under emergency conditions.

Prototype Die Castings Offered for Testing

Prototype Die Casting Service is a new process which provides product planners and designers with small quantities of simulated die castings for test purposes says William G. Newton, Jr., president of the Newton-New Haven Co., Inc., 680 Third St., New Haven 4, Conn., custom producers of aluminum and zinc die castings.

Newton reports that his company has devoted over a year and a half to the development of a casting method which would be capable of producing castings which "looked, felt, finished and performed" like production die castings yet eliminated the necessity for investment in production dies and tooling.

"Our aim," reported Newton, "was to offer American industry a low cost opportunity to try die castings on their newly developed products."

Men-on-the-move

E. Easter, formerly of Reynolds ls Co., has become aluminum wire rod sales manager for Alabama Co., Florence, Ala., major manurer of aluminum cold head wire aluminum insect wire screening.

wneer Co., Niles, Mich., has named **hen A. Furbacher** executive vice dent. He had formerly been vice ident in charge of the company's Product Div'n, St. Charles, Ill.

agene L. Mackey has been appointvice president in charge of engiing for The Yoder Co., Cleveland,).

ewart Die Casting Div'n of Stewartner Corp., Chicago, has named **sell F. Gotha** manager of the divi's Bridgeport, Conn. plant.

ppointment of **Forest M. Palmer** as ager of sales development of Aluium Limited Sales, Inc., has been ounced by the company.

onsolidated General Products, Inc., ston, Texas, has appointed **J. W. gan** director of marketing.

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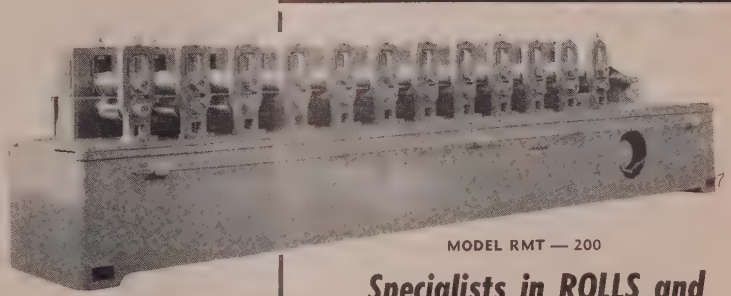

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Looking Ahead

As business upticks started sprouting in March, the stock market took off as though a boom was just around the corner. As manufacturers' sales and orders turned higher, and as exports spurted, prices started firming on steel, plywood and lumber. By early April, even aluminum prices stiffened a bit. Alcoa increased prices on small unalloyed ingot orders; now charges up to 10 cents per pound extra for orders under 10,000 pounds, vs. 6 cents previously. Alcoa says this reflects added costs of handling small orders. It's not a giant step, but at least someone is taking a stab at price stability.

It's no secret that U. S. aluminum is being shipped abroad at low, low prices, and some of it is coming back at low prices. Aluminum demand abroad has tapered off; first quarter exports were considerably lower than last year. One good reason: Primary production has increased elsewhere. This accounts, in part, for the reduction of U.S. output to between 73 and 76% of capacity. It's likely to remain at this level until producers' inventories have been reduced — which is now happening. But this isn't the big problem.

If orders for aluminum sheet, extrusions, tube, castings continue their current upward movement into May and June, inventories can diminish rapidly. While first quarter shipments didn't show any appreciable rise, a gradual improvement is underway in the current period. This trend can easily gain momentum if construction and home building get more active. The appliance field, while not in a boom, continues to use more aluminum per unit. This helps. But the auto industry isn't buying as much as expected. If the upward buying trend continues into June, our guess is that second quarter aluminum consumption will be 10 to 12% higher than any period during the past 18 months.

Aluminum foil sales continue to bustle along at a record clip. If this continues, output this year will easily top 125,000 tons. Household foil sales alone exceeded $80 million last year — greater than all other household wrapping products combined. Ten years ago this market for foil amounted to $4 million. Quite an increase. As expected, Reynolds Wrap is top dog.

Shipments of nonferrous castings in the past decade wouldn't encourage many to enter the business. For instance, lead castings have held steady at about 10,000 tons a year; copper has dropped from an average of 450,000 to 400,000 tons annually; magnesium has slipped from about 17,000 to 12,000 tons a year; and zinc castings have dropped from an average of 350,000 tons to around 310,000 tons per annum. Aluminum is the only exception, having jumped from an annual average of 300,000 to 375,000 tons during the past decade. However, aluminum sand castings skidded from 100,000 tons to 65,000 tons and permanent mold castings edged up from an average of 100,000 tons to a current level of 130,000 tons. Biggest increase has been in aluminum die castings, jumping from 100,000 tons to 180,000 tons a year. If the price of aluminum remains stable and automakers continue to use more castings, aluminum die castings can easily become the big daddy in the next ten years.

City of New York is leading other areas out of the archaic building code mess which has existed for 25 years. New York's building commission has all but proved that the city's codes have failed to recognize changing construction techniques and new building materials that have proved acceptable. As a result, aluminum (and plastics) will soon be accepted as standard building materials. When officially adopted, the aluminum industry should send New York's new codes to every other city, town and village, as well as to architects, builders, construction firms and money lenders.

New projected forms and building designs will result in greatly increased per unit consumption of aluminum and glass, particularly for aluminum sliding doors. So says Ador Corp. of Los Angeles. The company predicts a doubling of demand in California to about half a million sliding doors annually in four years. They also predict a boost nationwide increase to over 2,000,000 doors annually. Ador anticipates a 23% sales increase to $3 million this year. This prediction is interesting, but why will Californians buy 25% of all aluminum sliding doors by 1965? Will they be richer? Or is the sliding door that much more popular out west?

More aluminum hearings? You might ask why, since the last Yates Congressional Hearings were a flop. As long as aluminum looks like a political football, it'll be kicked around. The House Small Business Committee Chairman, Wright Patman, plans to "go to the people" this year. will take his dog and pony show to cities other than Washington so that small aluminum fabricators can tell him how the producers are driving them out of business with low prices on fabricated products. Patman also wants to learn how best to give small business tax relief so that they can plow earnings into plant expansion and improved facilities. As far as prices are concerned, he'll hear the same mixed-up chatter we've published at regular intervals since the first government aluminum hearings in 1941. As for tax relief, he'll never be able to hear a fraction of the witnesses. Before he gets his traveling expenses, Patman might save time, money and embarrassment by first asking the President about chances for lowering business taxes.

—The Editor

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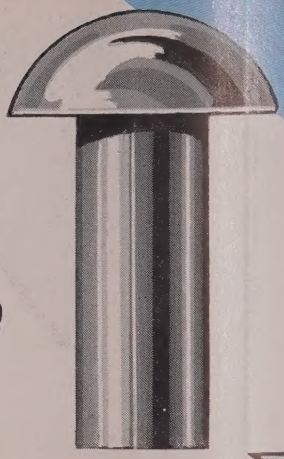

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